THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, COPPER AND BRASS, THE BRASS FOUNDER AND FINISHER AND
ELECTRO-PLATERS REVIEW

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MOLDING AND CASTING A BRONZE MONUMENT

IN THE ARTISTIC FOUNDRY WITH THE MEN FOLLOWING THE PROGRESS OF A JOB FROM START TO FINISH.

By W. N. NELLY.

"Come on, four of you men, bring some rollers and pry-bars, we have to unload—the models have arrived—call the carpenter to open these boxes!" The pieces are now carefully taken out and the model is set up in the plaster shop. There is a new personality very much felt by everyone—that of the sculptor through his work. Everyone that touches that model or has anything to do with it acts just as if the artist were present. In due time some one is detailed to start on the new job, the plans having been gone over and knowing what there is to be done, and how. The model is covered by a layer of clay which takes now the place of the gelatine which will fill the space between the model and the plaster shell. The gelatine impression being of a special composition which does not stick, although poured on any surface or any material, is sure to take a perfect imprint with remarkable fidelity of any line, or any scratch, however light it might be. About ten hours after the last section of the gelatine has been poured, the mold is opened and ready for the wax room, where a wax cast the thickness of the bronze will be made.

This is obtained by first facing the mold with a composition of pure beeswax of the consistency of medium hard plastiline, which is applied with brushes in a molten state. After this is done the different sections of the mold are assembled and the impression, now plus the facing, is lined out with a hard black wax which takes the thickness which is specified in the plans of the bronze casting—the lining out is done by pouring in the hard wax when it has reached a certain degree of heat, allowing it to remain in the mold until the required thickness is attained—and then pouring the surplus wax out of the mold again.

BRONZE GROUP OF ART, SCIENCE AND HISTORY, CAST BY LOST WAX PROCESS.

After this is done a core is made and supplied with especially designed supports which will reinforce the core and cast which, if left hollow, would crumble under its own weight. When the core is completed, the mold is opened and lo! there stands an exact reproduction of the plaster model.

This is the greatest point of advantage conceivable; not found in any other process of casting, because only in the "Lost Wax" process has the sculptor an opportunity to put the final touches on his work in such a way that should he wish to cover the whole surface of the piece with finger prints, those finger prints would be faithfully reproduced in the bronze cast. The work of retouching a "wax" is of the most fascinating sort to the sculptor, it is like putting your autograph to your picture or to your latest book.

In reproducing a clay model in plaster some of the finest details are necessarily lost because the waste mold must be washed with more or less stiff brushes or sponges; it must be soaped and oiled, which means more brushing. But once a wax model is left by the artist, it is the mold of that that needs no brushing of any kind until the bronze is poured into it, and here is where the real task for the foundryman begins, turning that wax model with all the work that has been bestowed upon it by the sculptor into eternal bronze. A sequel of questions arises in the mind in charge and every one of them must be answered. A sequel of problems which must be solved before the plan to be followed is laid out, as very

few pieces, if any, especially large castings, can be handled in the same way. Even two portrait busts life size can be so widely different from one another, that diametrically opposite methods for casting them must be used.

Then there are the difficulties which arise while the work is in progress and which can be surmounted only with the help of recollections of past experiences. For instance, an extra wide kiln must be built. "We had trouble in firing such and such one that time"; and there you go—back over years of experience written down on the foundryman's log. Back to the time of some other job similar to the one now on hand and live over again some difficulty that was encountered, in the solution of some hard problem that required all the concentrated power of thought of some man to solve. The work being done so far only by hand, requires most skill and intuition in acting, more than mathematical calculation, the latter only to a certain degree.

It would be like a man holding a Winchester to defend himself from an enraged tiger, to stop and figure the way out of the scrape he is finding himself in by means of algebraical calculations. After the necessary gates are attached to the wax model, the necessary raisers and vents carefully calculated, the facing process takes place; then the reinforcing of the facing; then one of the different methods is used in finishing the mold up. The whole (mold) is baked until all the wax is burnt out, then the baking is over. This may take from over night to 20 or even 30 days, according to the size of the molds.

It sounds rather easy and commonplace, still this baking process involves sometimes trepidation bordering on frenzy on the part of the ones concerned and responsible; besides the labors of the men, drenched with perspiration, busily firing sets of two fire boxes, 14 feet by 2 feet, patching crevices on the kilns, changing flues, etc., in constant vigil day and night.

The baking over, the mold is left to cool off to a certain degree when it is lifted, in some cases turned upside down, and then lowered into a pit where sand is packed hard between the mold and the walls of the pit. This done, arrangements for melting large quantities of metal having been made, the mold is ready to be cast.

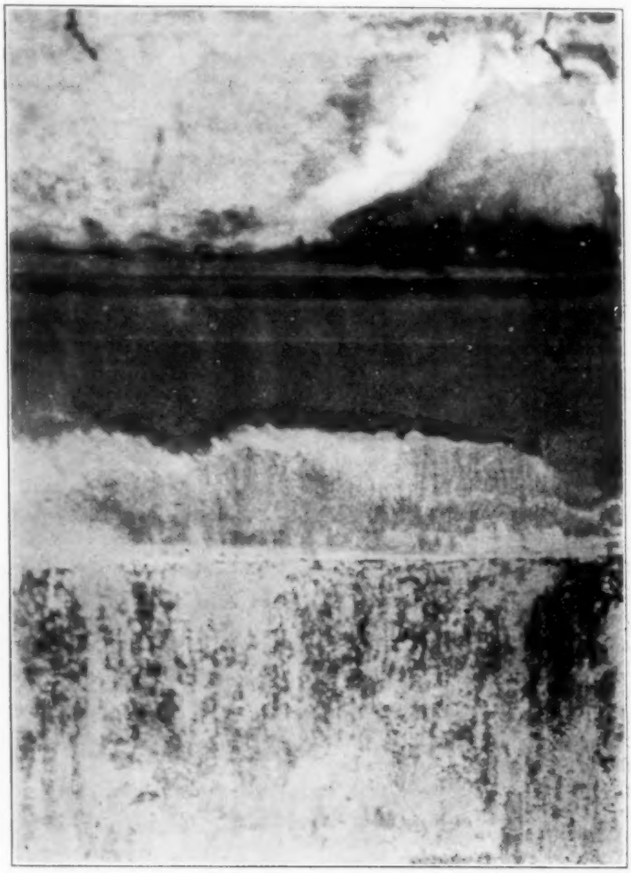
The metal, which has been melted in one or more batteries of crucibles, each crucible holding from 250 to 500 pounds of metal, is mixed into one or two large enough ladles. The ladles are swung into proper position, and the metal cooled down to the requested degree of heat, the ladle is then tilted and the mold "poured."

A score of pairs of eyes are watching the performance, "one-two-three-ten seconds, twenty, the mold is full! the metal, true to the calculations, was sufficient, the sand well rammed, the drains well plugged, they stood the pressure all right—the mold was baked to perfection because the metal 'went in' like oil. Sure sign of a sound casting, How nice the vents and raisers came up, The heat of the metal was just right for the piece, I am glad everything went O. K., It's there now, Do not see why it should not be first class."

With this and like remarks the molder's part of the work is done. The thought borne in the mind of the sculptor has been made immortal—it is there to speak to future generations of present men and things.

A few hours are allowed until the bronze has cooled sufficiently to permit the mold to be safely dug out and broken, after which the casting is cleaned, the "sprues" cut and then it is brought in the finishing shop and finally into the coloring department where the finished works receives their patinas.

PECULIAR FORM OF OXIDATION.



CHELSEA FIRE FROM THE MARSHES.

This extraordinary picture was discovered on a sheet copper anode which had dried after being taken from a cyanide plating solution. It does not require much stretch of the imagination to see a conflagration on the other side of a body of water. The sample came from Cutter and Wood Supply Company, Boston, Mass.

ASSORTED COLORS ON BRASS.

Some very interesting results in coloring brass can be obtained by dissolving 200 grains sodium thiosulphate and 200 grains lead acetate in 1 pint water and heating it to from 190 to 195 deg. F. Immersing the work in this for five seconds will make it pale gold, fifteen seconds, brown-gold; twenty-five seconds, crimson; thirty seconds, purple; forty-five seconds, an iridescent bluish-crimson-green; sixty seconds, pale blue; sixty-five seconds, mottled purple; eighty seconds, nickel color; eighty-five seconds, mottled blue and pink; one hundred and ten seconds, mottled purple and yellow; two and one-half minutes, pale purple; four minutes, mottled pink and yellow; five minutes mottled pink and gray; ten minutes, mottled pink and light blue. Other combinations of color can also be obtained, but some of these fade and change color unless protected by a coat of lacquer. By using one-quarter ounce of sulphuric acid in place of the lead acetate a variety of colors can also be produced, but they will not be as good a quality as those made with the above solution. Nitrate of iron can be used with equally good results.

COPPER CYANIDE PLATING SOLUTIONS*

An Article Dealing With a Technical Explanation of the Action of the Metal Cyanides in Electro-Plating.

By Dr. Max G. Weber.

I have chosen as a subject the Working of a Copper Bath, as this is by far the most extensively used and also the most instructive solution. There are three things which are necessary for the deposition of metal, current, electrode and electrolyte, or plating solutions. As the plating solution is the most important, I will confine myself to this item. The object for employing cyanide solutions for the deposition of copper is to be sought in the fact that in such solutions iron does not replace copper, notwithstanding their places in the electrolytic series, a phenomenon which is due to the complexity of the salt in which the copper is present. The complex salt, which makes this feasible, is the double cyanide or sodium copper cyanide, the anion of which is Na, the cathion $CuCy_2$; that is, by the action of the electric current, Na travels toward the cathode, $CuCy_2$ toward the anode. In other words, copper is not present in an ionized stage. Under proper current conditions, i. e., not too high current density and a suitable concentration of the solution, Na is not discharged at the cathode, but reacts with an undissociated part of $NaCuCy_2$, as per the following equation:

$$Na + NaCuCy_2 = Cu + 2\ NaCy,$$

thus showing that the deposition of copper is a secondary reaction, and that free cyanide is formed. On the anode, the anion $CuCy_2$ combines with the copper of the electrode, forming cuprous cyanide $CuCy_2 + Cu = 2\ CuCy$.

Cuprous cyanide is insoluble in water, but soluble in cyanide solution, and for this purpose the free cyande generated at the cathode is required. Supposing we have proper conditions—low current density on both electrodes—enough free cyanide is produced on the cathode in order to keep in solution the cuprous cyanide formed on the anode. As the free cyanide of the cathode is really needed on the anode for dissolving purposes, and as in a still solution the mixing velocity is very slow, stirring and warming of the electrolytic bath would expedite this matter considerably and bring the bath very near to an ideal stage. However, warm and agitated solutions require a more careful observation on account of which these two items have not as yet been paid the attention they actually deserve.

If a too high current density is used on the cathode, not all the Naions act reducing on the sodium copper cyanide, but are partly discharged, forming sodium hydrate and hydrogen in connection with the water of the bath:

$$Na + H_2O = NaOH + H.$$

This reaction accounts for the development of hydrogen or gassing at the cathode. It means that less copper is deposited per current unit and not sufficient free cyanide formed in order to keep the anode clean. Therefore the solution necessitates the addition of sodium cyanide, otherwise the anode becomes coated and the passage of the current is interrupted. A too high current density on the anode leads to the same result; covering the electrode with an insulating film of cupri-cupro cyanide. In regard to current density it must be borne in mind that warmed and agitated solutions can be worked with a higher current density than cold ones, and that a density of approximately thirty amperes per square foot is quite feasible without yielding a burned and blistered deposit.

Another feature which is quite interesting is the amount of metal deposited per ampere hour. In a copper cyanide solution which contains the metal in the cuprous stage, the same amount of current should yield twice as much metal as in an acid bath, providing, of course, all the favorable conditions are prevailing, i. e., a strong solution, warmed and agitated, worked with a minimum amount of free cyanide at a low current density. As, however, common plating solutions are worked on nearly the contrary conditions, the relative amount obtained from a cyanide bath is much lower. How much lower depends entirely on the relative conditions and only one feature should be emphasized, which has been mentioned above, that the more hydrogen develops on the cathode, so much lower is the percentage of the metal deposited per current unit. A low current density results in a high percentage of the metal deposited per electrical unit, while the deposition is slow. A high current density yields a lower percentage proportionately, but consuming less time for a certain amount of metal deposited, resulting in a greater deposition of metal per time unit. Furthermore, cyanide solutions yield a finer, more homogeneous texture and brighter metal film than the acid baths on account of the secondary copper deposition and because hydrogen may develop more freely on the cathode in such a solution without fear of burning or blistering the deposit. These few remarks give an idea how complicated the reactions in a plating solution are, and that it requires skill and experience to procure a satisfactory deposit.

The first part of this paper has shown that the constituent which is essential in a copper cyanide bath is the double salt, sodium copper cyanide, consisting of copper cyanide and sodium cyanide, which is easily formed by adding the necessary amounts of each chemical to water. A high grade sodium cyanide has been obtainable for quite a number of years, but copper cyanide could only be procured at prices which made its use prohibitive for technical purposes. For this reason many salts—one might call them subterfuges—have been used which were intended to substitute copper cyanide and form the same when brought together with cyanide solution. One should bear in mind that whatever copper salt is brought together with cyanide solution, the final compound is the double salt, sodium copper cyanide. Another fact which should not be lost sight of, is that one chemical can replace another only to the extent of the requisite elements, and that by the reaction of two such salts, always a by-product is formed which contaminates the compound desired.

This is the case with the copper cyanide. Copper carbonate, copper sulphate, copper acetate, cupri-cupro sulphite have been employed in order to form copper cyanide in connection with sodium cyanide and water. That by these reactions an inert byproduct consisting of sodium sulphate or sodium sulphite or sodium acetate or sodium carbonate is formed to a high percentage, every one was aware of, but took it for granted as the product necessary, i. e., copper cyanide, was not

*Read before the Lewis Institute, Chicago, Ill.

obtainable commercially. When using copper carbonate, which is really basic copper sulphate containing a small percentage of carbonate, according to the temperature at which it is precipitated, approximately one-half pound of inert matter is formed for every pound of copper carbonate, being composed of sulphates and carbonates. By the use of copper acetate or cupri-cupro sulphite this inert matter is still further increased, and for each pound of the compounds used from nine to ten ounces inert salts are produced. These salts accummulate in the bath more and more with every addition of the respective copper salt, and finally yield such a dense solution, which, being overloaded with these waste compounds, cannot be worked in a satisfactory manner any longer; the plated articles being blistered and the solutions are of necessity discarded. The reasons for this is that a bath of this kind has a relatively low metal concentration and a much higher one of the inert salts. As a rule, the electric current deposits the metal easiest to discharge, which in this case is the alkali metal. Therefore, as the current density increases, an excess of hydrogen is generated, which causes burning, and the current output drops considerably.

After considering this crude method of forming copper cyanide one should remember that the copper in a cyanide plating solution is in the cupro stage, while copper carbonate, copper sulphate, copper acetate are cupri salts ,and cupri-cupro sulphite is a mixture of both. This means these salts must be first reduced to the cupro state before they are fit for plating. This reduction is executed at the cost of the sodium cyanide which is actually intended for bringing the copper metal into solution only. Further, neutral copper salts as copper acetate, copper sulphate and cupri sulphite, when brought in contact with cyanide solutions form cupri cyanide first, which, being an unstable compound, decomposes into cupro cyanide and cyanogen, which latter escapes into the air, and on account of its highly poisonous character is most detrimental to the health of the plater.

Taking into consideration all the disadvantages resulting from the present method for producing a plating solution, every progressive plater should greet with joy the fact that a chemically pure cupro cyanide is now on the market at a price making its use more economical than that of any other copper salt which has been accomplished by new manufacturing methods worked out by the author of this article.

Cupro cyanide contains nothing but the ingredients necessary in a plating solution—copper and cyanogen—so that by dissolving it in cyanide solution no inert, unnecessary products are added. This enables the plater to have perfect control of his solutions at all times, as whenever metal is needed he adds it in the form of copper cyanide, and when cyanide is needed, sodium cyanide thus simplifying matters. On account of its high percentage of metal—it contains 70 per cent. pure copper, the rest being cyanogen—solutions highly concentrated in metal can be worked at a relatively low specific gravity. This is a further advantage, as a bath low in density is much more easily controlled than a very concentrated one.

Copper cyanide being a cupro salt, does not consume any cyanide in order to be transferred to the cupro stage, and because of its being a cyanide itself it requires less sodium cyanide than any other copper salt to yield the double salt sodium copper cyanide, the essential constituent of a plating solution. This fact points out a more economical method for producing a plating solution. In other words, it saves money. When one buys a metal salt for plating, one should not forget that it is not the price of the metal in the salt itself which constitutes the economy of the salt, but the price at which the metal is put into solution as a double cyanide. It is this economy of the copper cyanide, combined with its high technical qualities, which makes copper cyanide superior to any other plating salt.

The following figures give a comparison of plating solutions produced with different copper salts and are the results of actual tests. The metal contents of the following solutions are the same:

Copper cyanide, 70 per cent copper:		
100 pounds copper cyanide, 42 cents per pound	$42.00	
100 pounds sodium cyanide, 129 per cent., 22 cents per pound	22.00	
		$64.00
Copper carbonate, 50 per cent. copper:		
140 pounds copper carbonate, 14 cents per pound	$19.60	
239 pounds sodium cyanide, 129 per cent., 22 cents per pound	52.58	
		$72.18
Cupri-cupro sulphite (termed red copper compound, 40 per cent. copper:		
175 pounds red copper compound, 30 cents per pound	$52.50	
160 pounds sodium cyanide, 129 per cent., 22 cents per pound	35.20	
		$87.70
Copper Acetate, 31 per cent. copper:		
220 pounds copper acetate, 25 cents per pound	$44.00	
193 pounds sodium cyanide, 129 per cent., 22 cents per pound	42.46	
		$86.46

After continuous operations for two hours it was found that while the solution made up with copper cyanide remained almost constant, that is, the relative proportions of metal and cyanide were practically the same, the solution made up with the other salts became unbalanced. The anodes coating over requiring further additions of cyanide showing once more that solutions made up with chemically pure copper cyanide gave maximum efficiency.

As so-called copper carbonate was the most extensively used, I gave this solution special attention and found, after considerable experimenting, that in order to obtain a solution with sufficient free cyanide to obtain a fairly balanced solution the following proportions were necessary:

140 pounds copper carbonate, 14 cents per pound	$19.60	
280 pounds sodium cyanide, 29 per cent., 22 cents per pound	61.60	
		$81.20

These comparative figures vindicate once more one of the most important rules in chemistry—that pure materials not only give the greatest efficiency, but are the most economical.

The present, which is distinguished by the endeavor to obtain an end as simply and as economically as possible, where everything is standardized in order to obtain the best results at the lowest cost, no farsighted man can dispute the fact that copper cyanide brings this desired standardization to the plating industry, which means the utmost economy and the highest results.

PRESENT-DAY ASPECTS OF ENGLISH FOUNDRY PRACTICE

A Partial Comparison of the Advances Made in the Melting and Molding of Cast Iron and Metals.

By Joseph Horner.

Foundry practice wears many aspects today because it has become specialized, as have other departments of engineer's work. Only the more salient aspects can be dealt with here. These include the melting of metals and alloys, the mechanical operations of sand molding and the assistances given to these by machines, and the shop arrangements which are desirable for the large range and varied character of the

PRODUCING CORES FOR FITTINGS ON SMALL HYDRAULIC CORE MACHINE AT RATE OF 200 PER HOUR. MADE BY LONDON EMERY WORKS COMPANY, LONDON, ENG.

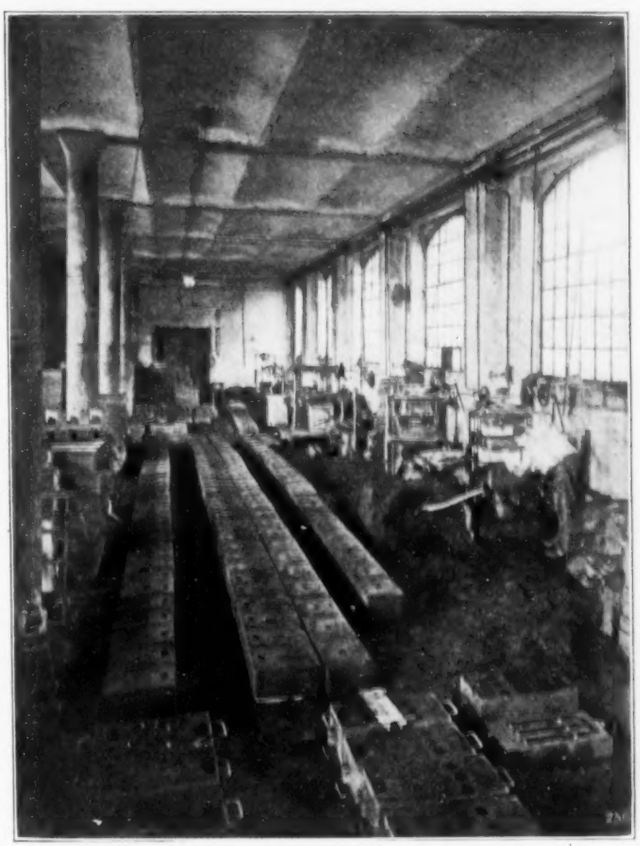
operations that are performed in foundries of different kinds.

The melting of metals and alloys for foundry purposes is almost wholly confined to two great groups of furnaces, the cupola and the crucible types. The utilization of the reverberatory furnaces is by comparison exceptional. These are employed chiefly for malleable cast iron, and only occasionally for ordinary cast iron when it is wanted of exceptional purity or when large masses of scrap have to be melted—sometimes also for brass. Both cupolas and crucible furnaces have undergone many modifications during recent years to secure broadly an increased melting rate or ratio of fuel burnt to metal melted, more thorough fusion, and more intimate intermixture of the grades of metal or alloying elements used.

The most remarkable aspects of the later cupolas occur in the tuyere arrangements, and in the inclusion of the forehearth or receiver. The first is favorable to the thorough and economical melting of the metal, the second to its intermixture and non-oxidation.

Beyond these provisions no economical arrangements commend themselves to ironfounders. The conditions in brass founding are of a different character. Here the later economies are secured by utilizing waste heat in various ways, by the substitution of gaseous for solid fuel, and by employing large crucibles and furnaces for heavy casts instead of multiplying the smaller sizes.

The utilization of waste heat is accomplished now in many ways. One of the commonest is the employment of a double chamber in these furnaces, the regular melting chamber being surmounted by a preheating chamber. The lower one contains the melting crucible, the upper one another crucible, or a supplementary vessel only in which the brass or other alloy is heated by the gases discharged from the furnace below. Many kinds of arrangements with this object are made. Usually the preheating chamber is constructed on a pivot or hinge, so that it can be swung



BOXLESS HYDRAULIC MOLDING MACHINE. VIEW SHOWS FIVE HOURS' WORK ON 12 x 16" MACHINE.

aside laterally to permit of the removal of the crucible below. In a few designs this is not removed, but remains in position until worn out. In these cases the furnace is made to tilt bodily for the pouring of the metal through a spout into a casting ladle.

In addition many brass melting furnaces now are operated by forced draught instead of by the natural draught of a tall chimney, and some are surrounded

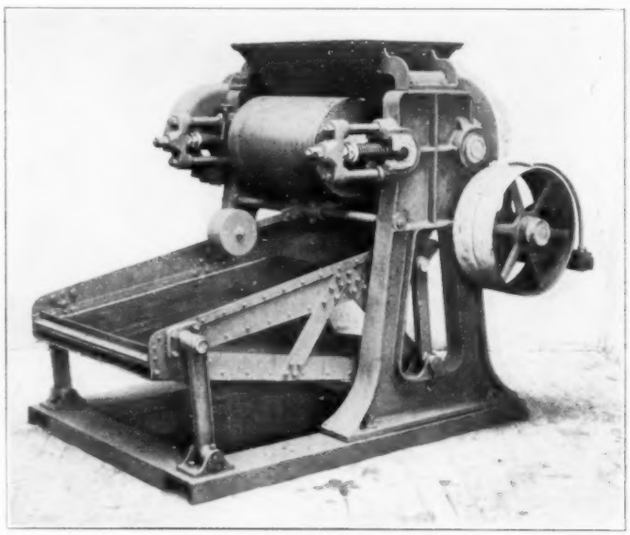
with an air belt discharging through rows of tuyeres. In others also the blast is warmed by the heat of the discharged gases. By the joint economies thus effected the ratio of fuel to metal melted is greatly reduced, while the day's output is increased.

The mechanical operations of sand molding and the assistance given to these operations by machines have undergone many recent developments. It is difficult to state the salient facts with brevity. But the fact which stands out most apparent is the vast increase in the numbers of molding machines, in the growth of their dimensions, and in the various details of their construction and operation. And besides these there is also the remarkable growth of the auxiliary aids to molder's work which though not wholly are largely consequent on the developments in machine molding. Because this practice grows at so rapid a rate the output of the foundries in which it is established causes all the auxiliary aids that were previously employed to fall behind and become inefficient because they are unable to deal with the demands of supply and service made upon them by the new conditions of higher efficiency. Everything is affected: the sand supply, that of molding boxes, of hoisting and transporting machinery, of fettling, and much more. It also modifies the methods of the pattern-maker's department and influences those of the machine shop. Machine molding does not stand where it did only five years ago. Many things have happened in that brief period, many too are even now in course of rapid change. New types, new methods of operation, vast extensions of earlier systems into wider spheres, render the modern foundry a fascinating study.

BELT-DRIVEN RECIPROCATING SAND RIDDLE ON STAND. LONDON EMERY WORKS COMPANY, LONDON, ENG.

The first important fact to be noted is that the work of machine molding embraces in its catholicity all kinds of castings, whether made in very small or very large numbers, in the whole range of dimensions from the smallest to those of four or five tons in weight, and up to 10 feet or 12 feet in length or in diameter It was not always so. For many years the system was only employed for the smaller castings made in large numbers. The next fact is that no one type of machine can be or is expected to deal with every class of work even when the dimensions are not in question. Some machines are only suitable for shallow articles, others only for those of good depth, and so on. Another fact is that different power agencies have their own proper applications. For some machines, hand operation is to be preferred, for others compressed air, in some, water pressure. Some machines are extremely specialized, but most are adaptable to various kinds of service.

Among the many-sided aspects of machine molding some stand out in stronger present relief than others do. The most notable advances now being witnessed are the following: Jar-ramming, multiple-molding, snap-flask work, rock-over machines, portable machines. Jar-ramming is the latest invention, the others though not so recent are in course of rapid extension. All except the first named have grown up and developed in response to the immense output demanded of molding machines that deal with small castings, and of the growth of specialized manufactures which call for such castings in enormous and ever increasing numbers.



BELT-DRIVEN SAND SIFTING MACHINE WITH ROLLERS FOR CRUSHING LUMPS AND ALSO WITH CONVEYORS.

The jar-ramming machines deal with a class of work apart from these. The proper sphere for jar-rammed molds lies in deep and heavy work, not in shallow molds. The consolidation of the sand by severe bumping of the machine table with its box and pattern is a practice the idea of which would be on first thoughts repellent to a molder, who endeavors to avoid all jarring and vibration in handling his work. But then it must be remembered that the jarring ceases with the consolidation of the sand round the pattern, and during the jarring, certain precautions are essential or the mold would not be sound and homogeneous. Much experimenting therefore had to be done extending over a considerable period, but the result is that the vibration which would be fatal to a good mold is prevented by a cushioning of the action at the moment when the bumping is arrested. This is done either by coiled springs, or by the readmission of a small quantity of compressed air following the exhaust immediately before the jar occurs on the anvil. These details differ in the hands of different makers.

(To be continued.)

PRACTICAL SUGGESTIONS FOR THE BRASS FOUNDRY

SOME GOOD ADVICE CALCULATED TO AID THE MELTER AND MOLDER.

BY R. MICKS.

The production of brass castings has become one of the leading departments in the foundry business and every year it increases in quantity and also quality of the goods produced. The wise brass founder realized long ago that even though there is very keen competition in this line a high grade of work must be turned out in order to get a share of the business on the market. In this respect, the brass foundry has held its own ahead of any other branch of the foundry business.

In order to get these results a lot of thought and time has to be given to the foundry until a good practical system is working smoothly, as there are many small details which need attention if it is wished to build up a perfect system in the foundry. No plant can be run on theory and to get good results, it pays to have a good practical man at the head of each department. This man should try to acquire a technical knowledge of every branch of the trade, for it is impossible to become a first-class foreman in the foundry or any other department unless some training is obtained along these lines.

The selection of material for the brass foundry is one of the main points that should be given great care, especially when buying scrap as a great deal of the scrap brass on the market nowadays is doped with lead and aluminum. In weighing out metal for a certain formula one must be very exact for if there is a little too much of one metal and not enough of another it is impossible to tell whether or not the original mixture is correct. Next to the selection of material comes the melting. This is the most important part in producing brass and other alloys for the best of metal and molds will count for nothing if care is not taken in the melting. A new crucible should be well tempered before using for melting and this can be accomplished by putting it in the core oven at a steady heat and leaving there for a week or so. It will then last twice as long as if it was used when new. When packing a crucible for the furnace some metal should be placed in the bottom of the crucible and then the flux should be added. A small handful of common salt is an excellent flux for brass. It is also cheap and will do the work required of it as well as any high-priced flux on the market.

After the crucible is charged and put in the furnace, the metal should not be allowed to melt without proper attention as more dross or oxide will be created and dissolved than if it is assisted in settling down in the crucible by being kneaded or pushed down every little while, although the metal should not be poked at continually as this would retard the melting. The additions of cold metal when charged upon the top of the metal that is already in the pot will act as a feeder and force the heated metal down into the fluid stuff at the bottom of the crucible where it should be protected from further oxidation by a covering of charcoal.

The fires should also have continual attention and a good reliable furnace-man in a brass foundry is very desirable as it is in the melting of the metal that porosity and similar difficulties must be guarded against. Crucible rings can also be recommended for they act as a feeding hopper and exert a constant pressure on the charge below and force it down as it becomes soft thus greatly lessening the possibility of oxidation. Oxidation is one of the greatest evils the brass founder has to contend with. When it does not cause porosity or sponge-like holes it produces a dross which is carried into the molds and though it is invisible to the eye it forms a porous path through which leakages may occur. This condition can be overcome to a certain extent by deoxidizing the alloy. For this purpose phosphorous can be recommended unless the metal has not been properly melted in the first place, when more or less trouble will always be encountered in removing the bad effects.

The best quality of molding sand should be used if it is expected to get first-class castings and although it costs more in the first place it will be found to be the cheapest in the end, when the loss is figured up after using cheap sand. A molder is able to make more and better molds with good sand and less time will be spent in cleaning and polishing the castings as good sand gives the articles cast a smooth face and also lessens the chances of the molder making scrap. The flasks should also be kept in good condition with good level joints and tight pins as it does not make any difference how good a mechanic a man is, good work cannot be done with poor equipment.

In handing out the jobs, the foreman should study the different men and give each man the class of work for which he is best suited. It will be found that this will do away with a great deal of scrap that is bound to come if work is given to a man who is not competent enough to handle it. There should be a place for everything and the men should be made to understand from the start that when they have finished with any tool or equipment it must be returned to its proper place. A good many hours are wasted in hunting up material that has been thrown aside by some careless workman. Daily report sheets also play an important part in the foundry, that is, if the thing is not overdone as it is in some plants where there is so much system that it costs more for extra office help to handle it than the money saved by the system. A common sense report sheet system is a great help as it enables one to check up orders every day and to tell how orders stand that are on the books. It also prevents one from over-running orders and as some lines of work are only called for once in a lifetime, this will save a lot of time and material.

The foundry foreman should always have a copy of the previous day's core-room report so that he will not hand out jobs that the cores are not ready for. This will save time and trouble for the molder, who would have to leave the mold open until the cores were ready or get another pattern, all of which is wasted time. The molder who is working on light work should be kept as near the furnace as possible, because he has to handle the metal much faster than the men on heavy work. A little judgment and thought will save many a step in the foundry and all these steps mean money lost to the employer and waste energy for the workman.

A foreman or foundry superintendent should never be satisfied with the present system employed, but should be constantly on the watch for anything that will improve on the conditions existing in the department or help to build up a perfect system that will yield the greatest output with the least help and at the lowest possible cost.

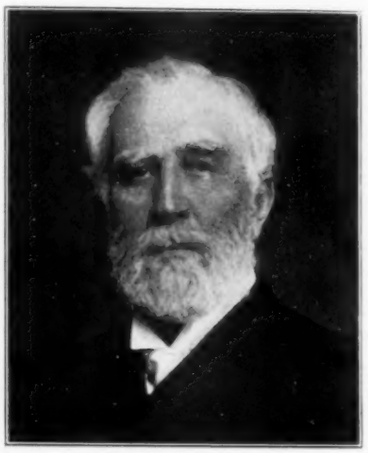
PRICE OF MAGNESIUM.

Magnesium, which before the war was selling for 5s. to 5s. 6d. ($1.22 to $1.34) in England, now brings 40s. ($9.73) per pound and is very scarce at that. Several firms having government contracts find their supplies nearly exhausted. Germany heretofore produced all the magnesium used in England, but an English product is appearing which is said to be highly satisfactory.

MANUFACTURER OF METAL GOODS FOR SIXTY YEARS

REMARKABLE RECORD OF WILLIAM H. HART, OF THE STANLEY WORKS, NEW BRITAIN, CONN.

Having for sixty consecutive years been honored with election to an executive office of the Stanley Works in New Britain and a good share of that time holding two important such capacities at once, William H. Hart, eighty years old, resigned as president on February 16 at the annual meeting of the stockholders. He accepted a newly created office of chairman of the board of directors. George P. Hart, son of William H. Hart, was elected to fill the presidency made vacant by his father's resignation. E. Allen Moore, his son-in-law, was made vice-president. Another son of Chairman Hart, Walter H. Hart, was elected to the newly created position of assistant secretary.



WILLIAM H. HART.

The record of William H. Hart in the metal manufacturing world is probably unequaled by any other man in the United States. He became secretary treasurer of the Stanley Works on May 16, 1854, having just reached his majority. He is now eighty years old and will observe his eighty-first birthday on July 25. When he first became identified with the Stanley Works it was a small plant capitalized at $30,000. Today its capital is $2,500,000. For thirty years Mr. Hart held the offices of secretary and treasurer and then retired from the secretary's position, but continued as treasurer until May 16, 1904, rounding out a full half century. Previous to this, however, in 1885, he had been elected president as well, so that he held the offices of president and treasurer from that date until 1904. Since then he has been president.

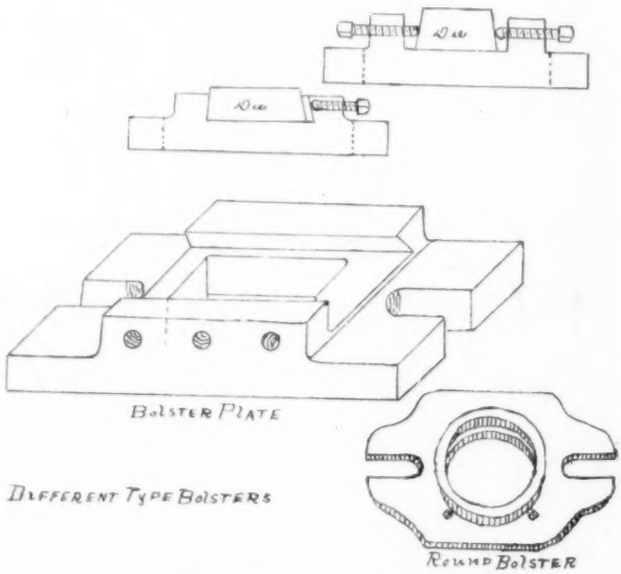
In a reminiscent mood Mr. Hart gave THE METAL INDUSTRY correspondent a brief resume of the Stanley Works up to date. This company was organized under the joint stock laws of the state in August, 1852, with the modest capital of $30,000. F. T. Stanley was president, and to him Mr. Hart gives nine-tenths of the credit as founder of the company. During the early sixties and seventies the company escaped bankruptcy by the narrowest of margins, but later recovered and soon after put out of business about twenty concerns making hinges and butts. "During the past twenty-five years, says Mr. Hart, "there has been a steady growth and as the business has increased my associates have willingly assumed additional responsibilities to match this increase."

DIE HOLDERS

BY EASY WAY.

There are numerous ways of holding small dies and punchers and by various methods. The large size dies and punchers are invariably bolted direct to the press platen and slide ram, but when small dies are held on it (the platen), different forms of holdfasts are required. The most common types are shown in the sketches where one plan has set screws to hold both sides of the die and the other by the aid of a taper gibb and screws at one side only. These holders have many different names in use in our factories today, but all apply to the common and proper name "bolster" which also has the calling as chair, die bed, chuck shoe and are constructed both round and rectangular. With the rectangular shape the angle given to the holddown edges vary in many instances and differs as to the ideas of designers and overseers. However, the most satisfactory angle for all requirements is 10° from the vertical line and will be found to give the very best of satisfaction with a round bolsters. There are also different methods of holding the dies. Some use three set screws evenly distributed around the circumference, others use a bored angle 1½° taper, this method will prevent the die moving sideways if they do not fit each other exactly and is the same principle as holding a lathe center in the spindle of a lathe.

Again others use both the screws and taper fit for fear of the punch or die pulling out of its place. Some shops make a bolster for each die so as to leave the die permanently within it. But for economy and to save storage space standard dimensions can be adopted for the average sizes used, then two or three standard size bolsters are only required and will suffice. However, should a die be in constant action all the time then of course it would require its own bolster. For a bolster that is in constant use and more especially on heavy work machine steel should be used, because from the constant pressure cast iron will surely give way with the possibility of ruining both the die and punch and also breaking the press or bending the crank shaft.



SOME FORMS OF DIE HOLDERS.

In the machining construction of a bolster, first a roughing cut should be taken off the top and bottom, then a finishing cut on the bottom face. After this the die seat may be finished and the side bearings planed 10° taper; then if of machine steel, the ends drilled and slotted to receive the hold down bolts for the press platen.

If cast iron, this work is avoided at the time of making this pattern. Then the required size hole is produced for the work to pass through from the die after which the set screw holes are placed properly so that they will meet the die or gibb as the case may be. The die is then located in the bolster and the bolster on the platen of the press and brought in alignment with the punch located on the slide ram; after which they are both secured to perform their functions and they then require no further attention.

ABRASIVES *

A Descriptive Article Embracing the Various Kinds Used in Grinding and Polishing.

By Clarence Hawke.†

When we consider the importance of the part played by abrasives and abrasive tools in practically every branch of modern industry, we must wonder at the comparatively small supply of information to be obtained with regard to the general principles governing abrasion. Very little has been written on this important subject, and what knowledge we have has been obtained principally by comparison of results from actual trials made with different materials. In this way it has been possible to deduce certain general laws governing the subject and to establish general rules for the selection of the correct abrasive and best kind of abrasive tool for a particular class of work.

Abrasion is defined as the wearing away of one body by another of harder material. The body of harder material is then known as an abrasive, and this term may be applied in its true sense when referring to certain grinding and polishing materials. In its specific sense, when used in connection with modern artificial abrasives, the term is correctly applied, as these materials cut rather than abrade. The term "abrasive" nas, however, been given a wider significance, and now includes generally all materials used in the grinding or polishing of other substances.

NATURAL ABRASIVES.

The first materials used by man as abrasives were found in Nature's store, and were used in their natural state; or in other words, were natural stones. They were employed principally in the production and preservation of edge tools, and to these the term abrasive was certainly correctly applied as the desired results were obtained by a tedious rubbing process between the abrasive and the softer material.

With the advance of knowledge in connection with the applied arts, a more rapid method of abrasion was sought. This was found in the grindstone, which consisted of a block of natural sandstone hewn into the form of a disc several inches in thickness and provided with a central arbor hole. The stones were mounted on a shaft and rotated slowly by means of a crank fastened on the same shaft. The results obtainable from such an arrangement were far superior to those obtained from any method previously employed. The use of the natural stone wheels was limited very largely by the fact that they did not have the physical properties, strength, etc., required for the effective grinding of metals. Grindstones in their original form, and improved by the power drive, are, however, still in use, and a reason for this may be found in the fact that the machinery required to operate them is of the simplest form.

The next important advance was made when certain natural materials possessing abrasive properties, but found in nature in a form unsuitable for use, were crushed to grain of a desired size, mixed with a bonding material and the mass molded into the form of a wheel. Such wheels could be operated at a considerably higher peripheral speed than was possible with the grindstone, and could be made of materials possessing higher abrasive qualities.

EMERY.

One of the first materials to be used and to become of value for the production of this new and improved form of abrasive tool was emery. Emery is a material many times harder and tougher than the abrasive constituent of sandstones, and is the intimate mechanical admixture of corundum and either hematite or magnetite, both of these latter mentioned minerals being compounds of iron and oxygen. Its value as an abrasive depends upon the amount of corundum present. It is extremely tough, and were it not for the fact that the emery obtainable from nature's store varies considerably in quality, and is often high in impurities, it would be of high value for certain classes of grinding.

As a binding material for these abrasive grains hydraulic cement was first used in an attempt to imitate the natural stone. This failed completely and a further step was made in the adoption of organic or vegetable substances, such as rosin, sulphur, rubber and shellac, silicate of soda, the three latter mentioned materials being successful in a certain field.

Such bonds, although still found to be of value in the preparation of grinding wheels for special work are not adopted for grinding operations where large quantities of material are to be rapidly removed. Their failure is attributed to the fact that the range of possible grades of binding is limited with such materials. The cost of such materials is also excessive.

As the grinding wheel came to be considered more and more as an indispensable tool in the working of metals, improvements were rapidly made in the method of bonding the abrasive grain. Bonding materials of a same abrasive nature were, therefore, substituted in the place of the vegetable bonds previously used. These bonds consisted principally of fusible clays which were mixed with the abrasive grain, the mass formed into the desired shape and then brought to a temperature sufficiently high to vitrify the mass. The actual amount of abrasion performed by a binding material of this kind in an abrasive tool is believed to be negligible, and in fact has been shown to be productive only of heat. This applies to any binding material, but as a bond is necessary in the preparation of any abrasive wheel composed of an effective abrasive this factor must always be considered and reduced to a minimum. Such a result can be accomplished best with a vitrified bond. Difficulties were experienced with the bonding of emery grains with this type of bond as the impurities contained in the emery, together with the uncertainty of its quality, prevented the attainment of duplicate results.

CORUNDUM.

Along with the development of better methods of bonding abrasive grain, other natural materials were substituted for emery, principal amongst them being corundum. Corundum, which is an aluminum oxide, is found in nature as crystals usually rough and rounded,

*Paper read before American Foundrymen's Association.
†Niagara Falls, N. Y.

or massive with nearly rectangular partings. There are many varieties of corundum, of which the ruby, sapphire and emerald are of the gem class. Corundum is, as has already been stated, the abrasive constituent of emery, in which it is so finely divided that it cannot be separated from the other components.

Next to the diamond corundum is the hardest known material occurring in nature. Mohs' scale of hardness corundum is given as 9 compared with the diamond as 10. The hardness of corundum must not be confused with its abrasive efficiency, for, although corundums vary but slightly in hardness, there is often a wide variation in the amount of abrasion which they are able to accomplish. The hardness represents the resistance of the corundum to abrasion, or to being scratched by another material, and also its power to scratch another substance. A fragment of corundum entirely free of decomposition may when tested prove to be of a hardness represented by 9, but to have a cutting efficiency that is very much lower than that of another piece whose hardness is just the same. The abrasive efficiency of a mineral or substance depends upon its hardness and fracture. The fracture should be irregular and not along parting planes as is often the case with corundum, in other words, the cutting efficiency depends upon that property which enables it to retain a sharp edge, when crushed into grain. All corundums do not possess this property, and many that exhibit it in the first stages of crushing do not show it in the finer fragments or grain.

As corundum is a product of nature it is often associated with foreign materials which are always softer than the corundum itself. These foreign materials, if present in large quantities, affect the abrasive efficiency very materially. If present in small quantities, the abrasive efficiency of the grain is not affected to any extent, but such impurities are found to be very objectionable when attempts are made to bond such grain into an abrasive wheel by means of a vitrified bond.

In the earth's make-up certain grades of corundum are obtainable which are suitable for abrasives, and by proper selection it is possible to obtain a grade of corundum of a fairly uniform quality, but as parting planes of fracture exist to a large extent in all corundums, its abrasive efficiency is effectively reduced by this factor. If it were not for this fact corundum would be of exceedingly high value in the grinding of materials possessing toughness.

GARNET.

Before leaving the subject of natural abrasives it is necessary to mention garnet, as this material although of no great importance in the grinding of metals, has been found to fill an important place in the grinding or sanding of wood. For this class of work the garnet grain, after being thoroughly cleaned, is affixed to the surface of either cloth or paper, by means of suitable glues, and is in this way used either in the hand or in the form of belts or discs mechanically driven. As garnet has a low point of fusion it is impossible to bond the material in the form of wheels with anything other than vegetable and silicate of soda bonds. This fact limits its value considerably, although there is a possibility that with a suitable vegetable bond, abrasive wheels might be made with garnet grain to successfuliy grind the softer materials.

In the scale of hardness, garnet lies between 7 and 8. This particular degree of hardness does not, however, account for its high value in the grinding of wood. The more probable explanation of this peculiar property is found in the fact that a fragment of garnet is seldom solid, but fractured along irregular planes. This property permits the grain to be easily broken down so that sharp cutting edges are always in contact with the fibrous material being ground.

ARTIFICIAL ABRASIVES.

There are several reasons for the superiority of an artificially produced abrasive material, over those obtained from nature's store. Principal among these is the possibility of obtaining a far more uniform and pure product by artificial means than can be found in the earth's make-up. The regular cleavage existing in some natural abrasives can be eliminated in the artificial, and the reduction of the abrasive efficiency from this source overcome. Further, artificial abrasives have been produced possessing far greater hardness and abrasive properties than anything that nature has supplied, with the exception of the diamond. The difficulties caused by the impurity and un-uniformity of the natural abrasives had attracted the attention of many prior to 1891, in which year E. G. Acheson discovered an entirely new substance, silicon carbide, better known under the trade name as carborundum. The discoverer of this new material quickly realized its possibilities in the abrasive field, as it was found to possess a hardness far above that of anything found in nature, with the exception of the diamond.

SILICON CARBIDE.

Silicon carbide is a material composed of one atom each of silicon and carbon. These two elements are driven together by means of the high heat of the electric furnace and the resultant material is found to possess a hardness of nearly equal that of the diamond, or from 9.6 to 9.7. In addition to it extreme hardness, silicon carbide possesses the characteristic of sharpness. This characteristic is accounted for by the fact that the crystal has an irregular fracture and always breaks down into fragments with sharp cutting edges. The combination of these two properties, hardness and sharpness, make this material an ideal abrasive for the grinding of cast iron, chilled iron, bronze, brass, granite, marble, etc. Silicon carbide is slightly more brittle than the diamond and to this property may also be attributed its extreme sharpness. Made at a temperature of approximately 2,200 degrees Cent., the grain is not affected by fusion with the proper clays, and vitrified wheels are successfully made. The purity of the final product can be controlled within definite limits, so that uniform results can be obtained.

Silicon carbide is found on the market under several trade names, principally among these being carborundum and crystolon.

(To be continued.)

YELLOW COLORS ON BRASS.

From a golden yellow to orange color can be given polished brass pieces by immersing them for the correct length of time in a solution composed of 5 parts caustic soda to 50 parts water, by weight, and 10 parts copper carbonate. When the desired shade is reached the work must be well washed with water and dried in sawdust. Golden yellow may be produced with the following: Dissolve 100 grains lead acetate in 1 pint water and add a solution of sodium hydrate until the precipitate which first forms is redissolved, and then add 300 grains red potassium ferricyanide. With the solution at ordinary temperatures the work will assume a golden yellow, but heating the solution darkens the color until at 125 deg. F. it has changed to a brown. A pale copper color can be given brass by heating it over a charcoal fire, with no smoke, until it turns a blackish brown, then immersing in a solution of zinc chloride that is gently boiling, and finally washing thoroughly in water. Dark yellow can be obtained by immersing for five minutes in a saturated solution of common salt containing some free hydrochloric acid and which has as much ammonium sulphide added as the solution will dissolve.

POLISHING WHEELS

AN ARTICLE, DESCRIBING THE VARIOUS VARIETIES OF WHEELS USED IN METAL FINISHING, IN THREE PARTS. PART II.

BY WALTER C. GOLD.*

(Continued from January.)

TAMPICO WHEELS.

A full description of Tampico wheels appeared in THE METAL INDUSTRY for the month of February, 1914. Briefly stated, Tampico is a wild plant which grows in the eastern part of Mexico and cannot be transplanted. Tampico wheel brushes are made principally in two types, the Peerless Farnham brush wheel and the old style wood block wire-drawn wheel. The former was invented and patented in 1900 at Honesdale, Pa., and the wheel is built up in sections, the average width of each section being ⅜-inch. In building these wheels the necessary number needed to make a brush of the desired width are put upon a spindle and balanced and then the wheel is nailed together; then placed upon a revolving trimmer which gives it practically a true running face. These wheels must be run with the use of metal flanges, which, when screwed up, gives the desired density or stiffness. As the flanges wear down a smaller pair are used until the wheel is consumed.

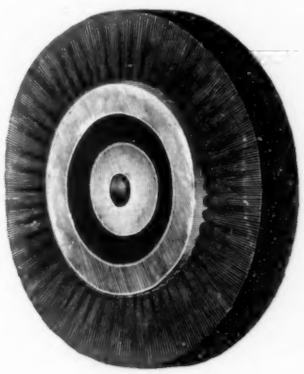
compressed linen wheel undoubtedly possesses over old canvas, leather or the old style section wheel, are several, the principal ones being:

The pliability of the wheel, which allows it to adapt itself to any inequalities in the coat of emery and consequently enables it to wear evenly; the weight of the material (which is much lighter than that used in any other serviceable wheel) which renders it less liable to injure the lathe bearings; and also the fact that the fibre edge of the linen, which is always presented to the article to be polished, will be found to give a superior finish. They are especially adapted for roughing iron, steel and other metals. They save emery, time and money; are made soft, medium or hard as required by the nature of the work.

WALRUS LEATHER POLISHING WHEELS.

Walrus leather has become very scarce during recent years and the price, therefore, has materially increased, the price depending upon the thickness of the hide, the

VARIOUS TYPES OF POLISHING WHEELS.



TAMPICO WHEEL.

A "SIDE" OF WALRUS LEATHER.

THE "DAY" COMPRESSED LINEN WHEEL.

In the wood block type, the wood centre is first turned on a lathe, the desired number of holes drilled and the Tampico drawn by means of copper or iron wire. Pitch is then poured into the groove of the block centre on both sides to prevent the Tampico from "backing out." It also strengthens the wire and aids in holding the rows of tampico in place. The brush is then placed upon a revolving wheel trimmer, trimmed and is then ready for use. The principal compounds used upon Tampico brush wheels are brush brass composition and emery paste. These compounds contain the desired proportion of "fat" which enables the compound to adhere closely to the wheel. A marked advance in the manufacture of Tampico wheels has taken place in the last two decades. Owing to the wars in Mexico, Tampico is very scarce—practically none coming out of the country at this time.

THE "DAY" COMPRESSED LINEN WHEELS.

This wheel is composed of odd pieces of linen adjusted in such a manner that they contain about seventy-five per cent. more material than canvas or the old style piece or stitched section wheel. The hardness of this wheel combined with its pliability and elasticity will immediately recommend it over the old style canvas, leather, or home-made section wheel. The advantages which the

usual standard of which is ¾-inch and 1 inch. Thicker wheels are obtained by gluing together discs of the foregoing thicknesses and then truing the wheels. Sides of walrus leather vary in weight according to thickness. A full hide measuring 8 feet long by 4 feet wide and ¾-inch thick weighs about 65 pounds; 1 inch weighs about 75 pounds. Walrus or sea horse hide when properly tanned is of a peculiar tough grain, yet on account of its singular fibre is of extreme resiliency and by many polishers regarded as indispensable for the finishing of table cutlery, iron, steel, brass, silver and other soft metals. It is also quite generally used by manufacturers of edge tools and hardware specialties requiring a fine finish. The choice cuts of walrus hide come from the middle section.

LAMINATED WOOL FELT WHEELS.

Are manufactured from discs of wool felt which is about ¼-inch in thickness. The solid wheel is made by cementing the discs from hole to circumference, using a pliable cement. The sewed wheel is circularly sewed from hole to circumference. These wheels are used on light stove trimmings and in the manufacture of light brass goods. They are much less in price than Spanish or French felt wheels—about one-half the cost. The supply of the stock, however, is limited.

*Of the firm of Walter C. Gold, Philadelphia, Pa.

SHEEPSKIN LEATHER WHEELS.

These are made from especially tanned sheepskin leather, the best being of whole discs of even fibre. They are manufactured machine-stitched (rows of lock-stitching ⅜-inch to 1 inch apart, as desired) and in the hand-sewed (with heavy twine for fine polishing); also loose (cemented at centre or sewed once around hole). This type is especially used for polishing uneven metal surfaces and where a very fine finish is needed. Lastly, there is the solid wheel, i. e., all ply being cemented together from hole to circumference, producing, when in use, an exceptionally fine finish.

"PIECED AND SEWED" OR "RADIAL THREAD SEWED" PRINTERS INK MUSLIN BUFFS.

This type is made from the "cuttings" of the tympan cloth, the smaller pieces laid in the body or interior of the buff, flanked on each side with a full blank and then radially thread sewed, the rows being about one-half inch apart. Stiffer wheels are obtained through sewing about three-eighths of an inch apart. These buffs are frequently sold by the pound, the wheels being made by a specified individual weight—about 8 ounces for 10-inch diameter; 10 ounces for 12 inches; twelve ounces for 14 inches; 14 ounces for 16 inches and 20 ounces for 18 inches. For certain classes of work, such as shovels, fancy colored ticking is used.

PRINTERS INK MUSLIN LOOSE BUFFS.

For "cutting down" and for roughing and heavy buffing, printers ink muslin buffs are used more extensively in some sections of the country than in others. They have always been popular in Philadelphia. The technical name is tympan cloth and comes both lightly and heavily inked, and in heavy and light weaves of muslin. For heavy buffing on brass work, these buffs are preferred heavily inked, dry and free from oil.

UNBLEACHED MUSLIN LOOSE BUFFS.

The standard weave of unbleached muslin used in this type of wheel is 64 x 68 holes to the square inch (or mesh as it is technically known) and weighing 3½ yards of 36 inches wide muslin to the pound. There are other weaves used such as 64 x 64 (a looser weave) and in the finer weaves, the count runs as high as 100 x 100. Fully 99 per cent. of the buffs used are loose, i. e., with one row sewing only around the hole; but for certain work it is desirable to stiffen the buffs by circularly sewing them ½ or ⅜-inch apart—they are then known as a full blank circularly, or radially thread, sewed buff.

"PIECED AND SEWED" UNBLEACHED MUSLIN BUFFS.

A good many of this style of buffing wheel are being used. They are made by taking part-ply muslin flanked on each side by the full blank and then radially sewed from hole to circumference lock-stitched about ½-inch or ⅜-inch apart. A buff averaging 23 ply is now in good demand, the larger sections weighing: 10 inches—6 ounces; 12 inches—8½ ounces; 14 inches—11¾ ounces; 16 inches—15 ounces; 18 inches—19 ounces.

There has always existed a difference of opinion as to whether the full-blank circularly sewed unbleached buffs are more economical than the pieced and sewed type. The writer always recommends the former, as the weave is at right angles not only, but the face of the wheel is radically different, the corners of the part-ply wheels coming into contact with the work. Such a surface cannot wear as economically as the more even and more uniform full blank wheel. The latter costs more but is the most economical of the two types when longevity and amount of work performed is considered.

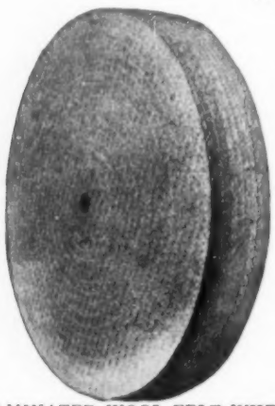
"PIECED AND SEWED" BLEACHED MUSLIN BUFFS.

Are made up of part-ply, flanked with two full blanks and then circularly sewed—lock-stitched—from hole to periphery. Used freely in sanitary brass work. They are frequently sold by the pound and the buffs are usually made of a weight to accord with customer's wishes.

BLEACHED MUSLIN LOOSE BUFFS.

This kind of wheel is used successfully for certain classes of work, such as "cutting down" on brass especially in sanitary brass works. It comes in various weaves and weights of sheeting.

VARIOUS TYPES OF POLISHING WHEELS.



LAMINATED WOOL FELT WHEEL.

LOOSE SHEEPSKIN WHEEL.

PRINTERS' INK MUSLIN WHEEL.

CANTON FLANNEL MUSLIN LOOSE BUFFS.

The weight of the Canton Flannel is a prime factor in the use of this wheel for "coloring." The best sheeting has a heavy "nap." The muslin being thick, a wide, fluffy wheel naturally results. They are usually supplied in 18 ply with one row sewing around hole. There are also quite a good many of these buffs used twine sewed in order to produce a more compact wheel and with a "spot" centre for tapered spindle.

Here we have reached the buff which so highly colors our electroplated silver and gold work—our jewelry and tableware, etc.

OTHER BUFFING WHEELS.

Buffing wheels are also made from material not mentioned in these papers; for instance, chamois has been used for some classes of light work. But, so far, the wheels which have been considered have been found to be best adapted. That perfection has been reached is not claimed for "change is the fundamental law of the universe." Until better substitutes are found, however, we must continue with that which, for the present at least, seems best adapted for those interesting phases of the finishing of metals known as grinding, polishing, coloring and finishing.

ALUMINUM: ITS ORIGIN AND SUSCEPTIBILITY

SOME POPULAR INFORMATION RELATING TO THIS WONDERFUL METAL.

By JAMES SCOTT.

There are signs that aluminum is gaining favor very widely and bids fair to replace many hitherto popular metals, on account of its inherent lightness, toughness,

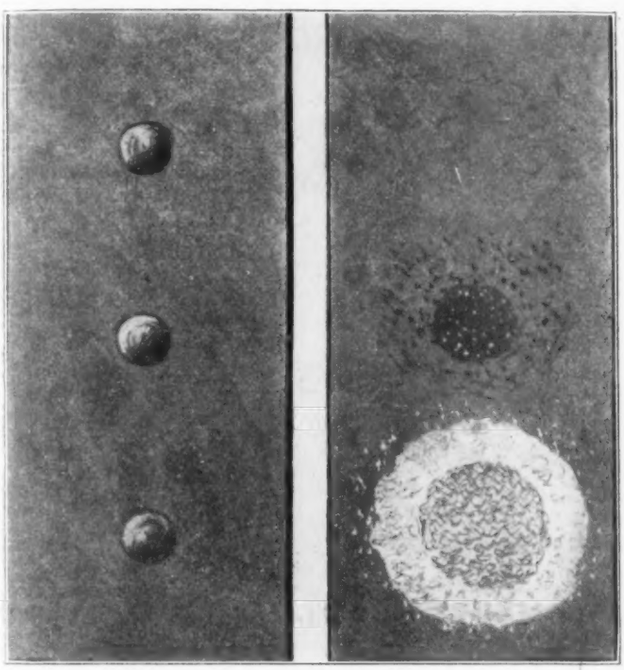


Fig. 1. Plates of aluminum. The first shows one with drops of nitric acid, hydrochloric acid and sulphuric acid upon it. The second shows the effects produced by these acids.

durability and other merits. The fact that it no longer resists the efforts of the solderer and welder enables the metal to take its place in the front rank of absolute mechanical necessities. The outlook for it is decidedly cheerful; and it is to be hoped that manufacturers will continue their improvements concerning its extraction and the modifications of its price.

It is certainly curious, in face of the difficulty previously experienced in satisfactorily obtaining it, that aluminum is the most abundant metal on the earth, far exceeding the estimated amount of iron. Every particle of clay, granite, shale, emery and similar geological substances contains atoms of the metal incorporated with it; and it is owing to the tremendous trouble involved during its displacement from these and kindred minerals that the world has not been able to enjoy the use of the metal as it might otherwise have done.

Aluminum is never found free in nature, but is always combined in the manner already indicated. Although it can manufactured from common clay, the more adaptable plan is to use bauxite (an impure, hydrated, silicate of aluminum), corundum (an oxide of the metal), cryolite (a fluoride with which sodium is connected) or chlorides (i. e., compounds of the metal with chlorine or hydrochloric acid). These matters will be again reverted to more fully.

Aluminum was discovered in 1827 by Wöhler, but its secret practically died out and had to be rediscovered in 1854 by St. Claire Deville, to whom Napoleon III, and the French Academy, gave assistance and encouragement for the further development of the wonderful subject. The experiments which led up to these results were at that time very remarkable achievements, seeing that the parent-substances of aluminum are difficult to deal with.

Ordinary clay is an insoluble aluminum silicate—this name really meaning that silica (of which sand, flint and quartz are typical examples) and the metal are intimately combined with each other. When clay is submitted to the action of sulphuric acid, silica is set free, and the acid forms, with the alumina, sulphate of alumina—i. e., pure alum. The obvious connection between alumina, alum and aluminum metal hardly needs pointing out. Common, commercial alum, by the way, contains some potash, or else ammonium, in addition to sulphuric acid.

The ruby and sapphire are merely forms of aluminum oxide—i. e., the metal and oxygen together—stained by the oxides of other metals.

Many claims have been made in respect of the introduction of electrolytical processes of extraction; but probably the most practical and original one was that patented in England and the U. S. A. by Messrs. Cowles during 1885. This was, however, beneficially supplanted by the Héroult-Hall method.

Obsolete treatments, depending on the chemical reactions occurring between metallic sodium and the double chloride of aluminum and sodium, need not call for further remark. They are certainly interesting, but mostly from a laboratory point of view.

Electrolytical methods have entirely replaced those of other forms, and these are continually being improved upon, with consequent benefit to the public. A

Fig. 2. The space of a pinhole, magnified, showing minute crystals of aluminum chloride. These are transparent when viewed apart from a black background. They yield the metal.

favorite process is to employ a pure solution of the oxide in molten cryolite. When the electrical current is turned on, the heat melts the mixture and sets the

aluminum free at the iron cathode, which is immersed in the molten metal. The oxygen engendered by the evolutions operates on the anode (i. e., oxidizes it)

Fig. 3. A magnified pinhole view of the pure powder oxide of aluminum, from which the metal is obtained, and into which it can be converted.

and thereby accelerates the rate of liberation of the metal.

The principal impurities of aluminum have generally been silicon and iron, but these are seldom found in the metal nowadays.

Aluminum is, as most readers no doubt know, a soft, white, clean metal without odor or taste, and is capable of taking a high degree of polish. It is only one-quarter the weight of silver, and becomes malleable between 100° C. and 150° C. It is highly sonorous when struck, and will not tarnish in air; nor will it combine, as silver does, with sulphurous fumes at ordinary temperatures. If a thin sheet of aluminum is laid in sufficient solution of potassium hydrate (i. e., caustic potash deliquesced or watered) it will rapidly dissolve and produce potash aluminate. Heat will cause a quicker reaction. Meantime, effervescence, due to the evolution of hydrogen will be evident.

We hear so much about ores in connection with the origin of metals that it seems to strike some people as curious that the useful aluminum has to come from the oxides, chlorides, fluorides, etc., of the metal, these compounds being nothing more than whitish lumps of clayey substance, or else powders produced by chemically or mechanically reducing them.

I examined some chloride of aluminum and found it to be like the details of No. 2. The crystals were quite transparent on a clear ground.

Oxide of aluminum was disclosed as a powder consisting of semi-crystalline insoluble grains of the kind shown in No. 3.

In all these cases—as well as others mentioned, but not illustrated—the metal exists in the crystals along with common gases only.

I took a plate of sheet aluminum four inches long and two and one-half inches wide. On this I deposited drops of nitric, hydrochloric, and sulphuric acids respectively, and watched the subsequent effects. The following day was the best time to make satisfactory observations (see No. 1). Although nitric acid is one of the fiercest, as a rule, it made not the slightest impression on the aluminum, and did not even show much vigor when heated.

The hydrochloric acid bit into the metal in such a way as to leave a somewhat dark smudge upon its surface. This, when magnified, was found to consist of congregations of small bubbles. The hydrochloric acid is capable of combining with the metals to compose a chloride of aluminum, a salt which will minutely crystallize as shown in No. 2, and in other ways if given the opportunity.

Sulphuric acid operated on the metal most effectively, there remaining a frosty white smudge in its place, which had extended for a wide area all around the original spot. It stood up very distinctly and snowy against the glistening metal, and was really sulphate of aluminum—i. e., alum. I scraped off some of this modified metal, let it fall into a drop of water on a glass slide—it then dissolved, with evolution of hosts of minute bubbles—and allowed the fluid to evaporate. At the finish, a few hours later, a white, lustrous salt remained in the form of crystals as shown in No. 4. This salt was pure alum, and tasted as such. It can be recrystallized as minute octahedra, objects which are each like two four-sided pyramids fixed base to base.

If the reader will make a very strong solution of alum, and when cold suspend a clean cinder in it, by means of a thread passing round a penholder and hanging across the mouth of the receptacle, he will within a few days' time obtain some extremely beautiful, large, octahedral crystals of the salt adhering to the cinder. These will, of course, contain the metal aluminum.

Aluminum "gold" is an alloy consisting of one part of aluminum and nine parts of copper.

In 1890 the world's annual production of aluminum

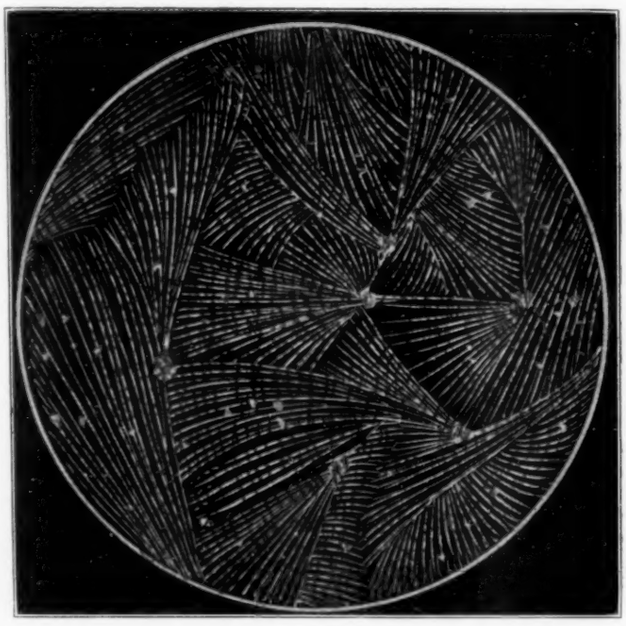


Fig. 4. A magnified pinhole view of sulphate of aluminum (alum) obtained by placing a drop of sulphuric acid on an aluminum plate (see Fig. 1) and removing and dissolving the resultant salt.

was only forty (40) tons. The amount had increased so marvelously ten years later (1900) that the output was between 5,000, and 6,000 tons!

THE CRUCIBLE BUSINESS

SOME REMINISCENCES OF AN EXPERT MANUFACTURER LOOKING BACKWARD A QUARTER CENTURY.

BY JONATHAN BARTLEY.*

(Continued from February.)

Almost every man you meet, that is interested in a business, from the cobbler up to the bank president is ever ready to tell you that HIS troubles out-distance those of any others, and while I fully realize that every line of business carries more or less responsibility and worry, let me tell you right here, that if a man is looking for trouble, of the old-fashioned Puritan type, that which is full fledged, gilt edged, iron bound and hermetically sealed, let him embark in the crucible business, and I'll guarantee that before many moons has passed he will look on his mother-in-law as an angel.

In the February issue of THE METAL INDUSTRY I outlined the process in the manufacture of crucibles, which showed it to be very simple, in which the least possible error could be easily detected. I, however, did not go far enough and point out the "double check" as applied in some shops. When the "mixing" is weighed out it carries a *number,* and this number is carried through the whole process of manufacture, so that when the crucible is finished and sent out it will have this number stamped on it. In this way the maker knows at all times what each customer gets, as the number is recorded on his books against the charge. As a rule, a "mixing" which will comprise of several thousand pounds will be made into three or four sizes, each of which will be stamped with the same number. For example, say a "mixing" has the number 3507. From this may be made a lot of No. 60s, 80s, 90s, etc. Brown orders some No. 60s, and later on reorders, specifying "quality same as last," Jones gets some of the 80s, and his reports are good, so on down, one after another get excellent results, when, all at once some little "penny ante" who buys probably two or three casks a year will put up a howl worse than a Cherokee Indian. He tells you the crucibles are "rotten," that he lost metal and labor, positively refuses to pay the bill, and ofttimes has the nervy bluff to tell you that he feels that you owe him, etc. With a concern of this kind, the matter of writing facts, pointing out how these same crucibles have given good service elsewhere is simply on the order of "pouring water on a duck's back," expecting it to stay there.

There are two classes of chronic "kickers." One is the ignorant, who conducts business in any old slip-shod way, the one who tells you, and insists that a "scalp" is the fault of the crucible maker, the fellow that is anxious to convey to you the fact that he has been in the foundry business for thirty years or more, and that he has forgot more than you know about annealing, etc. This type of man may be, and probably is, sincere in his belief, at the same time his trade will not make the crucible-maker's pocketbook any larger. The other type of "kicker" is more dangerous. He, it is, that wants something for nothing (and I'm sorry to say he has been getting it for the past five or six years) and, he it is that knows that once a crucible has been in the furnace a few times all trace of its life is lost, and with this knowledge he will, through his "make good" claim get his crucibles at half price if he consents to paying anything at all. He will "work" one manufacturer until he has reached the limit, then switch to another, go around once and then begin over again. A creature of this character should be barred from business.

As an illustration of this species, I will cite one case that came before me a few years ago. A salesman brought in an order from a firm that used size No. 80. When I looked at the order I told him that the people were "four flushers" and related to him their methods as I had learned them from former experience. He, however, persisted and a shipment was made. In a couple weeks along comes a letter saying that the crucibles were the "best ever," and the salesman felt highly elated, but to me it looked worse than ever. With the third shipment came the "expected." "Crucibles no good," "only three or four heats," "loss of metal," etc. Now, mind you, we had been careful to send them in every shipment the very same crucibles, made and stamped as described above, but all the tabs in the world was useless with them, so I called on them. They had eight crucibles over in one corner of their foundry which they said had only delivered three or four heats. I examined them and in doing this, turned them over, I noticed a small piece of a flat file imbedded in the bottom of one of the crucibles. It did no harm and I assumed that it had been dropped on the furnace floor and the pot in its hot condition on being drawn from the furnace had allowed the little piece to fasten itself. I did not mention it to them, but finally settled by allowing them four crucibles free of charge. Things ran along smoothly for the next two shipments, then along comes another kick. Same old correspondence, same persistent effort to have us believe the trouble belonged to us, finally I visited them again. This time there were eight more crucibles set aside, but I noticed that they were over in another corner. The usual examination, but in turning them over, lo, and behold, there was *that same piece of file!* In other words, they were palming off on me the very same crucibles I had already settled for at a loss. It is needless to say that I spoke my piece with the fervor of a ten-year-old boy delivering a Valedictory, but, the most interesting thing followed a couple weeks later when I met one of my competitors. In the course of conversation I asked him if he was selling so and so. He said "no, we did sell them at one time, but they were constantly finding fault, and investigation showed that we had lost money on everything we had sold them, so we cut them out entirely." I then told him of the file incident, and you should have seen his face. After getting his breath, he said, "Why, Bartley, I paid for those pots once, and I noticed that piece of file as I examined them." This is not an isolated case by any means; it is simply one among hundreds, although different tactics are practiced. This case, however, shows how one maker's pots can be used against another's.

Crucibles broken "in transit" is another way that a dishonest foundryman can "put it over" the maker, and this has been in times past practiced to a large extent. I have in my mind now three concerns that invariably made a claim for broken crucibles. Finally we adopted the plan of asking that the broken parts be returned, and after this it was surprising to note the safe transportation we met with. Crucibles are fragile, and with the best of care exercised in packing, now and then we have some broken, *but,* when a claim is put in against every shipment, coming from ones we *know* to be more or less out of line, it is only natural that we assume that something is wrong. One of the arguments these "pirates" advance is this: "We sell our castings under a guarantee, and if we send anything out that shows up wrong under the finishing, we

*Crucible Manufacturer.

have to stand for it and make good. This, in a way, is very good argument, but when the crucible maker asks him if it is possible for him to make up, say 10,000 castings, assemble them in one pile after being made from one poured, ship 3,000 to one customer, 2,000 to another and get the highest reports, and then, on some small order, go to this stock and pick out a dozen bars that will prove "rotten" he will, as a rule, crawl out with the remark that it makes no difference to him what the other fellow gets, he is looking out for his own interests, and I have taken good notice that he does it. Every crucible maker knows these to be facts, and I want to reiterate again that the great majority of crucible users are honest, and with the co-operation of such, the crucible troubles would be minimized to a degree, but when a premeditated "hold up" is made, there is only one of two things to do, either drop all dealings, or lose money for the sake of doing a big business.

I say it with a firm belief after having visited fully 75 per cent. of the foundries east of the Mississippi River, that fully 90 per cent. of the crucible troubles belong to the foundry, and this statement is borne out from the fact that a crucible maker very seldom hears a complaint coming from a rolling mill, or from any large or small plant where the least semblance of care is exercised. These being facts, there seems to my mind only one way to handle this unsatisfactory element, and that is for every maker to keep a "black list," exchanging now and then with his competitors. Every maker knows who has "stung" him in the past, and new members to the "four flusher" club are being initiated every day. So if the few makers would get together, form an organization for protection in this one particular matter they would not conflict with any law, not enhance the interests of the legitimate user, and in the end would wipe out the leech element that has crept in and is growing every year not only making the business unprofitable, but extremely nerve racking to conduct. Every crucible plant running today has thousands of dollars invested, and it is hard to estimate how much of our industrial world is dependent on them. The present war, cutting off the supply of raw material, may probably be the means of rehabilitating the business and putting it where it belongs, among the most important industries in America. To do this will require a concerted effort to disthrone the "Bandit" element that now exists. (To be continued.)

BRASS-WORKING INGENUITY OF THE ARABS OF THE DESERT

A Pocket Coffee-Mill, Something Our Own Brass People Might Make.

By L. Lodian.

A portable pocket coffee-mill would seem to be an anomaly, as the leverage required for grinding the roasted berries might appear to be in the way of anything of pocket dimensions. Yet the Arabs have had such a device for hundred of years, using it for grinding both coffee and spice. It is an example of the mechanical ingenuity of the desert. The handle is detachable and foldable, and slips inside of the mill when not in use, yet this insignificant looking mill—much smaller than a

FIG. 1. AN ARABIAN POCKET COFFEE-MILL.

marine telescope—grinds the coffee thoroughly to a flour-like powder, and it is to this exceeding fineness of the ground coffee that the Turkish beverage largely owes its fame.

The handle serves, both as a grinder and regulator by turning the screw in the lower part of the mill and the lower portion of the mill forms a permanent cup. The case is made of brass, and the motive parts are of steel. The mill will last for years, and the Arabs know of no other form of mill. They are being taken up largely in Paris by French motorists and continental tourists and are sold at ten francs apiece ($2.00). Wholly hand-made, the mills still originate from Levantin cities, such as Stambul and Damascus, although, of course, anybody is free to manufacture them in any part of the globe, and there would probably be more sale for them if made from aluminum.

It should also be noted that the foldable handle serves as a nut-cracker, as a powerful self-adjusting pocket

FIG. 2. ARAB POCKET COFFEE-MILL READY FOR USE.
When traveling, the nomads slip handle inside mill. Arabic inscriptions on barrel are native maker's name and address.

wrench and as a makeshift hammer for minor purposes, while the whole closed mill intact can be used, in dire emergency, as a formidable arm of defense, the same as a life-preserver.

Origin: Centuries ago, Arab horsemen required for their coffee grinding an easily portable mill—something which would conveniently slip into the saddle packet.

GOLD AND PLATINUM PLATING

SOME PRACTICAL FORMULAE WITH INSTRUCTIONS FOR THEIR USE.

BY M. KATERIDGE.

The best way in making up gold-plating solutions is to make them from a stock solution, using one ounce of fine gold. The ordinary 9-pound acid or ammonia bottles will hold just 80 fluid ounces; therefore one fluid ounce will just contain 6 grains (¼ pennyweight) of fine gold in solution. For each pennyweight of gold a formula calls for we would use 4 fluid ounces of stock solution. To make the stock solution the fine gold is cut up into very small pieces, dissolved in 2 ounces of nitric acid and 4 ounces of hydrochloric acid. Put the gold and acids into a deep bowl or dish; place this in an agateware pot, which contains about two inches of water, cover up with some stout wrapping paper stretched across and fastened on the lower side of the cover. In this way gold or other metals may be dissolved in acids, without the slightest trace of fumes being noticed. When the gold is all dissolved, add some clean water to the gold chloride; a quart or so will do.

Now add ammonia 26° B. in a slow stream, stirring all the time with a glass rod, until a dark brown precipitate is observed. Let the precipitated gold fulminate settle to the bottom. To the clear solution add a drop or so of ammonia. If a cloud or precipitate is noticed then ammonia must be added until the last drop fails to produce further action. Stir well and let settle, throw off or filter the acid ammonia water, which may be thrown away, and wash the gold fulminate five or six times with hot water; after which the gold is detached from the filter, into a dish, some c. p. cyanide of potassium is added until the precipitate is all dissolved, then put into an 80-ounce bottle and fill up to the top with clean water.

CHEAP ACID PROOF GOLD SOLUTION.

This solution produces on satin finished or highly polished brass, copper, German silver, etc., a bright and durable deposit of gold in 10 seconds and will resist the strongest nitric acid.

The solution should contain 40 fluid ounces of stock solution (10 pennyweight) to the gallon. To make up, take one-half of the quantity (20 fluid ounces) 3 ounces of c. p. cyanide of potassium and bring this to the boiling point in one gallon of water. Add a solution of cyanide of nickel to this until a highly polished piece of work turns slightly white around the edges, in about 10 seconds take it out and dry it; test with nitric acid. If the work does not stand the test more nickel must be added and then the rest of the gold. The cyanide of nickel solution is made by dissolving an ounce or so of nickel in hot water. Precipitate with cyanide, wash four or five times and then redissolve with cyanide. This solution may also be made as a stock solution. In working the acid-proof gold solution a current of 7 volts should be used. The solution is run warm, with pure nickel anodes. To keep up its specific gravity, fine gold or old worn out gold plating solutions may be added from time to time.

It will always give satisfaction, if the plating solution has the proper care, and I claim for this both a great saving of time and the fine gold it would ordinarily take to have the work stand acid. Satin or Roman finish work may be finished in the finishing solution direct, or it may be scratch brushed and then dipped in finish. Buffed work after plating and drying should be touched up a bit on an almost clean gold rouge buff, potashed, and wiped off with a soft sponge, then flashed in the finishing solution.

FINE GOLD FINISHING SOLUTION.

Fine gold stock solution (2 dwts.)	8 oz.
Cyanide of potassium	¼ oz.
Water	1 quart

ROSE GOLD SOLUTION.

Fine gold stock solution (4 dwts.)	16 oz.
Babbit's potash or lye	3 tablespoonfuls
Cyanide of potassium	3½ oz.
Water	1 gallon

This solution may be used for rose or Roman finishes.

Gold ornaments are sand blasted or steel brushed nicely, then potashed, scratch brushed and put into the solution until the smut is all over the work, which will take about 3 minutes. The highlights are relieved by hand and a little bicarbonate of soda (baking soda), scratch brush flat surface if design is made that way, rinse and flash in the finishing solution.

Cheap rose on copper, brass, etc., may just be acid dipped in nitric acid 1 part, sulphuric acid 66° B. 2 parts; rinse well and copper plate in cyanide of copper solution until it is well covered with a good smut, pass into the rose solution, and leave in just long enough to get a deep rose color, rinse, relieve with bicarbonate of soda, rinse off and dry. Silver after sanding should be potashed and scratch brushed copper plated, scratch brushed again and finished in the finishing solution.

The green gold solution is made by adding a sufficient amount of cyanide of silver drop by drop to the rose gold solution, working the solution all the time until the color is reached.

For a dark green or antique effect dissolve some carbonate of lead in caustic soda by boiling, add a few drops of this to the green gold solution until the smut is dark or black enough.

COPPER CYANIDE SOLUTION.

To each gallon of plating solution to be made take ½ pound of sulphate of copper, dissolve in water by boiling. When it is cold, add a solution of carbonate of soda (washing soda) to the copper solution until all is precipitated and thrown down in the form of carbonate of copper. It will take about 10 ounces of soda to throw down ½ pound of sulphate of copper. When all is precipitated stir well and let settle and wash four or five times. Now dissolve 6 ounces of chemically pure cyanide of potassium and 5½ ounces carbonate of soda; the chemicals being dissolved each in their turn are added to the copper, and then enough water is added to make the required amount of solution.

Copper cyanide can now be bought in crystal form and the trouble of preparation can be avoided.

SILVER STOCK SOLUTION FOR GREEN GOLD.

Dissolve one pennyweight or so of fine silver in nitric acid to which one-third its bulk of water has been added, when all is dissolved add some cyanide of potassium solution to precipitate the silver, and wash four or five times, then use just enough cyanide of potassium solution to dissolve the silver cyanide.

PLATINUM PLATING.

In an agate ware pot which will hold 2 or 3 quarts put 1 quart of water, let the water boil and add the chemicals in the following order:

2 pennyweights platinum chloride until dissolved.

2 teaspoonfuls phosphate of soda.

1 teaspoonful carbonate of soda.

1 teaspoonful sal ammoniac.

4 teaspoonfuls borax.

The chemicals should be added very slowly and each lot must boil for five minutes before the next is put in. As all solutions lose water by constant boiling, some pure water must be added to be as near to the original formula as possible or good results will not be had.

To platinum plate a piece of work nicely the article must have a very high polish, all scratches, etc., are removed by sand barbing, or with the use of a hard felt wheel and tripoli; tripoli brushed or buffed, then rouge buffed, wash out in ammonia water, pass into the potash or electric cleaner, rinse, then give a quick flash in the finishing solution, the slightest blush will do, rinse, then into the platinum solution and keep moving the work and platinum anode around as in coloring. When it gets the proper color, remove, rinse and dry out.

Touch up a bit with a soft dry buff, and the job is done.

FIRST AID TREATMENT*

INSTRUCTIONS TO LAYMEN FOR COMMON INJURIES AND DISORDERS.

WOUNDS THAT BLEED—ABRASIONS, CUTS, PUNCTURES.

Drop 3 per cent. alcoholic iodine into wound freely, then apply dry sterile gauze to wound and bandage it. Do not otherwise cleanse wound.

SEVERE BLEEDING.

Place patient at rest and elevate injured part. Apply sterile gauze pad large enough to allow pressure upon, above and below wound. Bandage tightly.

If severe bleeding continues apply tourniquet between wound and heart and secure doctor's services at once. Use tourniquet with caution and only after other means have failed to stop bleeding.

NOSE BLEEDING.

Maintain patient in upright position with arms elevated. Have him breathe gently through mouth and not blow nose. If bleeding continues freely press finger firmly on patient's upper lip close to nose or have him snuff diluted white wine vinegar into nose.

INJURIES WHICH DO NOT BLEED—BRUISES AND SPRAINS.

Cover injury with several layers of sterile gauze or cotton, then bandage tightly. Application of heat or cold may help, other means are unnecessary. If injury is severe place patient at rest and elevate injured part until doctor's services are secured.

EYE INJURIES, EXCEPT EYE BURNS

For ordinary eye irritations flood eye with 4 per cent. boric acid solution. Remove only loose particles which can be brushed off gently with absorbent cotton wrapped around end of toothpick or match.

Do not remove foreign bodies stuck in the eye. In that case and for other eye injuries drop castor oil freely into eye, apply sterile gauze, bandage loosely and send patient to doctor.

SPLINTERS OR SLIVERS EMBEDDED IN SKIN, EXCEPT IN EYES.

If easily reached withdraw with tweezers, then treat same as "wounds that bleed"; otherwise let doctor attend to it.

FIRE BURNS, ELECTRICAL BURNS AND SUNBURN.

Do not open blisters. Use burn ointment (3 per cent. bi-carbonate of soda in petrolatum) freely on sterile gauze applied directly to burn. Cover with several thicknesses of flannel or other soft material, then bandage, but not tightly.

ACID BURNS.

Thoroughly flush wound with water, then dry wound, apply burn ointment and bandage as above.

ALKALINE BURNS.

Thoroughly flush wound with water, then flood with white wine vinegar to neutralize (dilute vinegar for alkaline eye burns), dry wound, apply burn ointment and bandage as above.

EYE BURNS.

Treat in the same manner as other burns.

DISLOCATIONS.

In case of dislocation of finger except second joint of thumb, grasp finger firmly and pull it gently to replace joint, then place finger in splint and bandage it. In all other cases place dislocated part at rest and promptly secure doctor's services.

FRACTURES.

Make patient comfortable and secure doctor's services at once. Avoid unnecessary handling to prevent sharp edges of broken bones tearing artery. If patient must be moved place broken limb in as comfortable position as possible and secure it by splint.

In case of severe bleeding apply sterile gauze and follow directions under "Severe Bleeding."

DIZZINESS, HEADACHE, NAUSEA.

Give patient teaspoonful of aromatic spirit of ammonia in hot or cold water.

CHILLS AND CRAMPS.

Give patient 20 to 30 drops of Jamaica ginger in hot or cold water. If improvement is not speedily obtained send for doctor.

FROST BITES.

Rub with ice, snow or cold water, then treat as "Fire Burns."

INSECT BITES.

Treat as "Wounds that Bleed."

INTERNAL POISONING.

Immediately secure doctor's services. Make patient drink large quantities of water, preferably warm, and make him vomit by sticking one's finger down his throat or by other means.

HEAT PROSTRATION.

Give patient teaspoonful of aromatic spirit of ammonia in hot or cold water. In case body feels warm apply cold

to it; if necessary give cold bath. In case body feels cold and clammy, apply heat to it and immediately send for doctor.

UNCONSCIOUSNESS FROM FAINTING.

Lay patient on his belly and turn his face to one side. Loosen all tight clothing. Remove false teeth, tobacco, etc., from mouth. Apply cold to head, warmth to hands and feet. If breathing stops treat patient as directed under "Electric Shock." Give no liquids by mouth until patient is fully conscious. Then give teaspoonful of aromatic spirit of ammonia in hot or cold water.

SHOCK, FOLLOWING INJURY.

In case shock is due to severe bleeding control it first as directed under "Severe Bleeding" and summon a doctor.

Lay patient flat on back and keep him warm with blankets, hot-water bottles, etc., and provide plenty of fresh air. Let patient inhale fumes of aromatic spirit of ammonia. If fully conscious give patient hot drink or teaspoonful of aromatic spirit of ammonia in hot or cold water.

UNCONSCIOUSNESS FROM ASPHYXIATION BY GAS, SMOKE OR WATER.

Treat patient as directed under "Electric Shock."

ELECTRIC SHOCK.

Immediately free patient from electrical circuit using every care to protect one's self against electric shock. Then if patient is unconscious, even if he appears dead, lay him on his belly with arms extended forward, turn his face to one side, remove false teeth, tobacco, etc., from his mouth and draw his tongue forward.

Kneel, straddling patient's thighs, facing his head, and resting your hands on his lowest ribs. Swing forward and gradually bring weight of your body upon your hands and thus upon patient's back, then immediately remove pressure by swinging backward. Repeat this movement about twelve times per minute without interruption for hours if necessary, until natural breathing has been started and maintained.

DIMENSION STANDARDS FOR BRASS HOSE COUPLINGS

By P. W. Blair.*

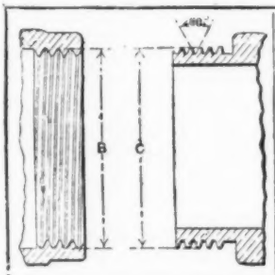
Brass hose couplings or connections for 2½, 3, 3½ and 4½ inch sizes have been standardized and adapted by the American Waterworks Association, The New England Waterworks Association, The National Firemen's Association, The National Fire Protection Association and a number of others, and also by more than 250 towns and cities in the United States. For sizes under 2½ inches, however, there is no universal standard; there are at least six different so-called standards used known as follows: Eastern gauge hose thread (used in the New England States); Pacific Coast Hose Thread (used on the Pacific Coast); Chicago Hose Thread (used in the Middle West); Pittsburgh Hose Thread, Boston Hose Thread and the Iron Pipe Thread which is the general standard for pipe threads.

Nominal Size	Eastern Hose Thread		Pacific Coast Hose Thread		Pittsburg Hose Thread		Boston Hose Thread		National Std. Hose Thread		Iron Pipe Thread	
	Outside Diam.	No. of Threads per Inch	Outside Diam.	No. of Threads per Inch	Outside Diam.	No. of Threads per Inch	Outside Diam.	No. of Threads per Inch	Outside Diam.	No. of Threads per Inch	Outside Diam.	No. of Threads per Inch
¾	1	11	1 1/16	11	1 1/16	11½	1 1/16	11	....	....	1.050	14
1	1 5/16	11½	1 5/16	11½	....	....	1 5/16	11	....	....	1.315	11½
1¼	1 5/8	11½	1 5/8	11	....	....	....	....	....	....	1.660	11½
1½	1 15/16	11½	2 1/16	11	....	....	....	....	....	....	1.900	11½
2	2 5/16	8	2 5/16	10	....	....	....	....	....	....	2.375	11½
2½	3 1/16	7½	3	7½	....	....	....	....	3 1/16	7½	2.875	8
3	....	....	....	....	....	....	....	....	3½	6	3.500	8
3½	....	....	....	....	....	....	....	....	4½	6	4.000	8
4½	....	....	....	....	....	....	....	....	5½	4	5.000	8

Machinery

TABLE I. COMPARISON OF THREADS OF VARIOUS SIZES.

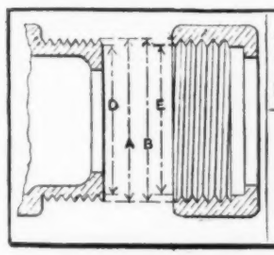
Table 1, prepared by the aid of a table furnished by the Elkhart Brass Mfg. Company, Elkhart, Indiana, gives a comparison of the outside diameter and the number of threads in the various sizes. Tables 11 and 111 give complete dimensions for the California Standard hose and Chicago hose thread as furnished by the Crane Company of Chicago. In addition to these "Standards" there is a great diversity of 2½ inch threads used by the fire departments of various cities. As regards the Standards there is no absolute agreement as to the dimensions, so that it is possible that some manufacturers deviate slightly from those given in the tables. It will be seen, for example, that the number of threads per inch as given in table 1 for 1-inch Pacific Coast or California hose thread differs from the number given for the same thread in table 11. The only actual standard is that of the iron pipe thread, which of course is extensively used in all parts of the country.



Nominal Size	B	C	No. of Threads per Inch	Clearance between Male and Female Thread
¾	1.080	1.070	11	0.010
1	1.320	1.310	11	0.010
1¼	1.860	1.850	11	0.010
1½	2.120	2.110	11	0.010
2	2.560	2.550	10	0.010
2½	3.050	3.040	7½	0.010

TABLE II. CALIFORNIA STANDARD HOSE THREADS.

President H. B. Sherman, of the Sherman Mfg. Co. of Battle Creek, Michigan, one of the largest manufacturers of hose brass goods, have adopted male and female thread templets and do not make them according to thread record. The different hose threads they manufacture are as follows: Boston or Providence thread, McNab & Harlan thread, California Hose thread, Iron Pipe thread, Chicago Hose thread, Eastern Gauge Hose thread, Pittsburgh Hose thread.



Nominal Size	A	B	D	E	No. of Threads per Inch
¾	1.081	1.099	0.931	0.949	11½
1	1.295	1.315	1.145	1.165	11½
1¼	1.705	1.728	1.580	1.598	11½
1½	1.946	1.964	1.796	1.814	11½
2	2.522	2.542	2.306	2.326	8
2½	3.048	3.047	2.812	2.816	7

TABLE III. CHICAGO, ILL., STANDARD HOSE THREADS.

*Mueller Manufacturing Company, Sarnia, Ontario, Canada.

EDITORIAL

OLD SERIES
Vol. 21. No. 3.

NEW YORK, MARCH, 1915.

NEW SERIES
Vol. 13. No. 3.

THE METAL INDUSTRY

With Which Are Incorporated
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Published Monthly

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CONTENTS

ELECTRO-PLATERS' SOCIETY

If there is anyone connected with or interested in the electro-deposition of metals who has a lingering doubt of the utility of the American Electro-Platers' Society let him read the accounts of the activities of this thriving association in this isue of THE METAL INDUSTRY. When a society only six years old does things in one month that requires four pages of a trade journal to record, then that society has amply fulfilled its destiny as an educational society. It does not require the logic of an Archimedes to forecast the future for such a society. It may be summed up in a few words: *it is great.*

The principal event of the past month in the proceedings of the Electro-Platers' Society was, of course, the sixth annual banquet of the New York and Newark, N. J., branches. This occasion as is told in another part of this isue of THE METAL INDUSTRY brought together two hundred enthusiasts. From early afternoon until after midnight the meeting room and halls of the Broadway Central Hotel were filled with platers and others interested in electro-plating. The various committees having the direction of operations deserve a great deal of praise and the thanks of all present for their painstaking efforts to make every one comfortable and at home.

As we believe honest criticism is one form of approval, we will take this opportunity to make a few suggestions. The first of these we believe will make for a more satisfactory culmination of an annual affair. The day of the week for the banquet should be as it was, Saturday, but we would recommend to change the dinner hour to seven o'clock and *have it on time.* Then limit the speakers to an agreed upon time and have these speakers talk upon topics that are open to debate. After say an hour of speaking have an hour of debate and thus bring the dinner proper to a close about ten or ten-thirty p. m. After this, if anyone wants to talk about shop problems, etc., there is time to do it in. On the other hand if there should be any out-of-town attendants who do not wish to stay in the city all night there is also time for them to get seasonable trains.

One other point and that is, it seems as though at least some of the speakers should represent the city or cities that the branches holding the dinner belong to. As a matter of fact of the gentlemen officiating at the dinner, two were from Pennsylvania, one from Connecticut, and one from New Jersey. Surely there is plenty of talent in either New York or Newark who could have been heard from.

Now that the American Electro-Platers' Society has so ably justified its creation and is fulfilling the predictions made during its early struggles: that it would become a

dominant factor in its field, it is time that the society turns its attention to some serious problems. One of the most important of these, it seems to us, is that treated of in the letter from our correspondent, "Garcia," appearing below. The subject, "Standardization," is one that should appeal to not only the plater, but also to all those who have to purchase and use chemicals of any kind. The arguments put forth by "Garcia" are good and based on sound reasoning and the recommendations he makes at the close of his letter are worthy of consideration and we should like to see them carried out.

Obviously the first thing to do in starting on a campaign of standardization, is to tackle the question of the purity of the chemicals used in plating operations. When a plater has satisfied himself that the chemicals he is using are what they are represented to be, then he can go ahead and produce a formula which, other conditions being equal, will give him *exactly* the same results every time; in other words, he can make a *standard solution*, but he *must* know his chemicals. The American Electro-Platers' Society is now in a position to help its members to get just this knowledge: how to test and know chemicals, through the various branches. There are at the present time at least six of the branches who have either a laboratory of their own or have access to one. The New York City, Newark, N. J., Bridgeport, Conn., and Toronto, Canada, branches are notable examples of those having their own laboratories—a photograph of the Newark branch is shown in this issue of THE METAL INDUSTRY. Here in these well equipped laboratories then the plater can either test his chemicals or he can be taught to test them if he is not able to proceed alone. Most every branch has a member, active or honorary, who is expert in chemistry and who is willing to teach his fellow member. We hope that it will not be long before we have the pleasure of publishing a set of "standard specifications for electro-platers' chemicals."

CORRESPONDENCE

WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY

STANDARDIZATION OF ELECTROPLATING

TO THE EDITOR OF THE METAL INDUSTRY:

First let us consider whether standardizing is possible or not under the present conditions. Next what has been accomplished in this respect, and the means that have been employed. Then what are the future prospects of general standardizing, and the result to the employer, and the foreman of the plating departments. Under the present conditions standardization is impossible and, *for this reason*. There is a lack of co-operation among both the employer and the foreman, this has to be overcome before there is any attempt made to do any work on *standardization that is worth while*. There is a remedy for this. But it is not taken advantage of by a large number of the *foremen* who, from long years of bitter experience, have come to the conclusion that the last thing they should do is to go to the *boss* with anything that may be of a nature that, on the face of it, looks like a case of spending money. Of course there are a few exceptions to this, as there are to anything else, but they are too few.

To cite a couple of instances where it might look like spending money; say a foreman goes into the office with a requisition for anodes, any kind at all but iron, some have trouble getting these at that, but for our example we will say nickel at about forty-five cents a pound. The purchasing agent, superintendent, or manager, whoever it may be will look at it and, as a rule say they will attend to it, or anything, to put it off. If the plater happens to be timid or, has confidence in them he will go back to his department trusting that he will have new anodes. After a time which he decides is sufficient for the receipt of the goods he makes inquiry, and if he insists, he finds that they have not been ordered yet. He goes to headquarters and has to tell that he cannot get along without them, and probably the boss tells him to do the best he can for awhile. He says he cannot and the boss wants to know why. After a lot of explaining, they decide that they can manage if they make additions of nickel salts in the meantime. That is what the foreman has been doing and he has to order more. As a rule he knows, but he does not know how it is worked out, that single salts contain the most metal, therefore he orders single salts. The boss looks at the order, and while he may pay 16c. for single salts he can get double salts for 9c. or 10c. per pound. Well to cut it short he arranges it so that he gets the double salts at 9c. *Now, remember the plater does not need a conducting salt, he needs metal.*

Here is the situation. The plating department may cost anywhere from $500 to $5,000 or more to instal the equipment and get it in good shape. There is a fixed charge for upkeep, that is the solutions have to be built up and properly looked after (that is high or low) depending on the nature of the work and the amount of it. Next comes the overhead, and this can be quite an item unless the foreman is a capable man and is able to look after it and take advantage of all the opportunities that are afforded by both the trade papers and societies that are a constant source of information that is first hand. After the plant is all fitted and put in good running order, perhaps either by an expert or by following the advice of one, a foreman is required. The firm, probably having the idea that so long as a man is a "Foreman" that is all that is needed, sometimes inserts an advertisement like this: "Wanted, foreman plater, state your experience, and wages expected." "Address XYZ." The usual result is that they get just what they are looking for, not a capable man, such does not answer an advertisement like this, but a cheap man. Sometimes they get a good foreman who stays till he gets another job, or the information he went after.

Then there is the foreman who has spent all his time at the plating and lines directly connected with it like polishing, buffing and lacquering. The chances are that this man has had little education, or the time that he had in school was not enough to enable him to get very far advanced, and so consequently, when he sees a problem that calls for decimals or the Metric System he is lost. The chances are when he meets one that is familiar with these things he is afraid that he will appear ignorant and will try to avoid any conversation that will involve them. If by any chance these topics do come up he is at a loss, and to cover his confusion, says, "These things are not necessary anyhow, as we are working in pounds and ounces, why not get these things in this way and we can understand them." As a rule this man knows his business as well, if not better than the average, and any problem that may come up in connection with this work he is capable of handling, if it is anything he is, or has been, called upon to use.

While the plater was learning his trade, there was another

fellow still in school learning just these things that the plater does not know. After this second man has finished school he may get a job in a grocery store or at some other clean work, but not receiving the money that the plater gets. He may accidentally get work in a plating room and work there long enough to get a little practical knowledge. He sees this "ad," answers it, and as his answer is better framed than the other fellow's, he gets the job that the other fellow was capable of handling with better results. If this matter had been put up to a committee of foremen platers they would have found out shortly which was the better fitted for the position, they would question him on his ability and experience, and could soon tell who was the better of the two. There are some foremen who are the best in their special line, as they have probably not worked at anything else. They might get this job and fall down on it and be considered no good, when as matter of fact they can be considered experts in their own line, with which they are familiar.

There are others who have the education and experience, and besides all this, have been around and worked in lots of shops, are capable of observing the various methods and retaining the best and discarding the rest. Usually they pick their own jobs and know what they are after and get it. As a rule they are paying a large price for the experience they get both in wages and time not employed. Some platers in turn pay a large price to some saloon keeper in order to get some of this experience. They know the value of it, *but* are they in a fit condition to take advantage of it under these conditions?

It would seem to any one who gives this matter thought that, if there was any possible way or method of bringing all these men together, and, to keep those who are capable and experienced and to discard those who are inefficient that the only result could be for the advantage of this group of men, and directly for the benefit of their employers. The advantage that would come would be this: the man who is an expert on one line of work would be in a position to take advantage of the experience of those who have gained it by changing their jobs often and travelling around, and vice versa. The *net result would be* that if the expert was out of a job he would be in a better and more favorable condition to take another job, or, as sometimes happens he would not lose his position on account of his firm changing their production or articles of manufacture, and, on the other hand he could put in a number of years and draw his salary regularly and not have occasion to change jobs if he so desired. *Still it seems queer that the firms have not themselves taken advantage of this experience,* but on the other hand, will hire the man who has got a settled way, and, oftentimes is way behind the times, and not up to the modern methods, only because he has worked so many years for so and so against the other fellow's wide and varied experience. Consequently as a rule the man that is capable is often reminded that, if he is so capable he should not have any trouble getting a job and holding it. *He never has to be out of a job except from his own choice* as witness the many advertisements for platers' helpers experienced on such and such a line of work and capable of handling his own solutions. These come from plants that *have capable and so-called foremen platers,* who if they were efficient will look after their own solutions for which they are responsible, *but they are too busy and cannot look after it properly.* These are matters that have to be adjusted before *standardization* is at all possible. There are several books on the market, some of them are worth the money, some are not, and all of them are mostly made up of matter that has been copied from others, whether it is good or not. The prevailing idea is to fill the book, no matter what goes into it, the more the better.

The American Electro-Chemical Society has at times, discussions that are closely related to the proper lines that should be followed for a proper way of *standardization* to be adopted. But, *do not expect a body of scientific men* to change their methods and systems of calculation simply because the plater uses fractions or pounds or ounces where they use the *metric* system throughout, and is, as a matter of fact, simpler, better, and easily understood. The American people would not change from their present money system, which is decimal, and go to the pounds, shillings and pence of England.

Mr. Davenport, of the Detroit Branch of the American Electro-Platers' Society, started the discussions on standardization with a paper presented by him. He is an honorary member there and an electrical engineer and, as all members of this group are very enthusiastic, but his outline although good, is more in the line of experimental work and too thorough for commercial requirements. The St. Louis Branch have the support of the superintendent of schools for means for the members to study chemistry. The Newark Branch have a chemical laboratory and had a good suggestion in the Bulletin that should be adopted; standardization of experimental methods and equipment. Prof. D. H. Childs, honorary member of the Buffalo Branch, has started on a series of talks on standardization in Buffalo, N. Y. All the branches have something on it, there are 16 now with Cleveland with a membership of around 500 altogether. Prof. Childs suggested that the committee composed of several men that are recognized as fully capable and having the required education made up of foremen platers and chemists, send out to 100 or more members, their results to try for six months keeping a correct record of all additions, and the results, also the action of special, or otherwise, of the solution and send it to the committee, and then get down to business with this data.

If the *employers wish to help now is their opportunity.* It is not at all necessary for the association to go to any expense on this work at all, in fact they can not with dues at $5 a year, and to raise them would be suicide. Say for instance, Mr. Wittmore, of Ireland, and Matthews, Detroit, Mich.; Mr. Walter Fraine, of The National Cash Register Company, Dayton, Ohio; Mr. Haring, of Rochester, N. Y.; Mr. Brown, Pierce Arrow, Buffalo, N. Y.; Mr. Servis, Chicago, Ill.; Mr. Nordbloom, Toronto Silver Plate Company; Mr. Reeves or Mr. Mesle, of Oneida Community, Oneida, N. Y., all are members of the association. I am acquainted with all but Mr. Servis and I know that they are all in sympathy with its objects, and have the equipment and ability to properly get the results and give the required information.

The result of *standardization* will be a better understanding for both the foreman plater and the boss; the boss will respect the foreman more than he does, knowing as he will, the scientific knowledge required.

Then when the plater orders chemicals he will be able to show the boss like this:

Single Salts:

$NiSO_4 7H_2O$. Atomic weights $58.7 + 96 + 126 =$ a molecular weight of 280.7. Then

$$58.7 \times 100 \div 280.7 = 20.91\% \text{ Ni}$$
$$96 \times 100 \div 280.7 = 34.20\% \text{ } SO_4$$
$$126 \times 100 \div 280.7 = 44.89\% \text{ } H_2O$$

or a total of 100.00%

Double salts:

$(NH_4)_2 Ni (SO_4)_2 6H_2O$.

$36 + 58.7 + 192 + 108 =$ a molecular weight of 394.7. Then

$$58.7 \times 100 \div 394.7 = 14.87\% \text{ Ni}$$
$$192 \times 100 \div 394.7 = 48.54\% \text{ } SO_4$$
$$108 \times 100 \div 394.7 = 27.47\% \text{ } H_2O$$
$$36 \times 100 \div 394.7 = 9.12\% \text{ } NH_4$$

or a total of 100.00%

The cost of metal in a single salt is 20.91×16c., or 3.3456c., that is per cent. of price paid, while of the double salt it is $14.87 \times .09$c., or 1.3383c.

Amount of salt required to equal one pound of nickel is for single 4.78 pounds, and for double salts 6.72 pounds, then 4.78 pounds at 16c. = .7648c., and 6.72 pounds at 9c. = .6048c.

GARCIA.

NEW BOOKS

SOUTH AMERICAN YEAR BOOK AND DIRECTORY FOR 1915.—Incorporating the South American Railway Year Book, the South American Annual and the South American Blue Book. Size 10 by 7 inches, 848 pages, including index. 104 illustrations and 56 sectional maps. Bound in cloth. Published by the Louis Cassiers Company, Ltd., London, England. Price $7.00. For sale by THE METAL INDUSTRY.

The book contains general information relating to the ten republics of the continent of South America, British, Dutch and French Guiana, Trinidad, the Panama Canal, and the Falkland Islands, as well as special articles relating to business conditions, and useful information for manufacturers seeking connections in South America.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—Kindly give us a mixture for white bronze which will have the appearance of nickel when polished and which will not tarnish readily, but otherwise have the properties of ordinary bronze.

A.—The following alloy is very satisfactory:

Zinc	78
Tin	18
Copper	4

The German silver alloys are too high in melting point to be suitable for casting by brass foundries with ordinary equipment. Practically all white metals will tarnish in time unless they are protected by a coating of lacquer.—J. L. J. Problem 2,108.

CASTING

Q.—Would like to get some information regarding casting aluminum spoons in dies. My experiment with an aluminum-copper alloy used in a brass die was a failure. What alloy would you suggest and also what kind of a die should I use?

A.—The following alloy has been used successfully in Germany for casting spoons:

Tin	5
Copper	5
Aluminum	90

The molds for casting thin articles like spoons would have to be highly heated in order to insure the castings running. We suggest the use of nichrome castings for molds.—J. L. J. Problem 2,109.

COLORING

Q.—We received the formula for the liver of sulphur dip, but this dip cannot be used where only a light deposit of silver is used, as it attacks the silver and thereby reducing it considerably. We understand that some platers are using a dark deposit (not black nickel) on silver which can be relieved with pumice and water without cutting much silver off the high places. Can you give us any information relating to this method?

A.—We believe the method of producing the finish you refer to is as follows: Clean iron turnings are dissolved in muriatic acid to a saturated condition. This method should be done out of doors and about 4 to 6 ounces of white arsenic should be added per gallon of acid while the iron is being dissolved. After the acid is thoroughly saturated, to every gallon of acid add two gallons of water and then add 2 ounces of sulphate of copper to each gallon of solution so prepared. Use anodes of carbon. This solution will produce a smutty black deposit that can be readily removed without any loss of silver. A little experimenting along the lines mentioned will give the desired results.—C. H. P. Problem 2,110.

COPPERING

Q.—Can you suggest a method of coppering galvanized articles by the tumbling process, same as foundry copper castings, of which, however, I have no other knowledge, and oblige me?

A.—The most satisfactory method to copper galvanized articles would be by the regular method of electro-plating. This method requires considerable experience to obtain satisfactory results. However, you can obtain a copper color upon the galvanized goods by immersing them in the following solution or tumbling them in maple sawdust moistened with a portion of the solution. The articles must be carefully cleansed, otherwise the copper will not cover well. It would be advisable to tumble the articles first in water to which is added about 4 ounces of carbonate of soda per gallon for fifteen minutes; then wash in clean water and immerse them in the solution or tumble them afterwards as mentioned. After coppering, the articles must be carefully dried out.

FORMULA FOR COPPER SOLUTION.

Water (160 degrees)	1 gallon
Sulphate of copper	7 ounces
Ammonia water (26 per cent.)	sufficient

to neutralize the free acid and give a clear blue tint to the solution.—C. H. P. Problem 2,111.

DEPOSITING

Q.—Can you give me a practical iron or steel solution for depositing on lead molds? Also kindly advise whether this shell could be case-hardened.

A.—Probably one of the best formulas for electro-deposition of iron consists of sulphate of iron and sulphate of magnesium. We suggest that a solution be made up as follows:

Water	1 gallon
Sulphate of iron	1½ pounds
Sulphate of magnesium	8 ounces
Ammonium chloride	2 ounces

The solution should be tested with blue litmus paper. If it changes to red very perceptibly magnesium carbonate should be added until the solution becomes neutral. To avoid the evolution of hydrogen excessively the solution should always be maintained neutral and it is advisable to maintain the neutrality of the solution when in operation by hanging small bags made from cheese cloth or other material and filled with magnesium carbonate. The voltage should not exceed 1 volt and the amperage according to the cathode surface exposed. Anodes should be of pure Norwegian iron. The shell of iron if of sufficient thickness may be case-hardened in the regular manner.—C. H. P. Problem 2,112.

FINISHING

Q.—We have a few electric portables to be finished in Etruscan gold, but we are not familiar with the process of obtaining this finish and we should be pleased to have you tell us how we can produce it.

A.—The Etruscan gold finish is usually produced upon plain surfaces in the following manner:

The parts should be made from brass or, if from other metals, they should be heavily brass plated and then placed in a lathe and revolved at about 250 revolutions per minute. Emery, Nos. 60, 80 or 100, should be used mixed with a little lard oil. Cotton waste or canton flannel may be used to hold the emery and oil while producing the Etruscan finish. A light pressure will produce a uniform finish similar to brush brass, but the reflected light is radiated more uniformly after the finish is produced. The articles should then be cleansed in benzine followed by the usual cleaning and then gilded in a good yellow gold solution.

After gilding the articles should be lacquered with a brush brass lacquer, as this lacquer contains more gum than the ordinary lacquers for gold, and it produces a higher lustre. Gold lacquers are also used for the finish in the place of gold. —C. H. P. Problem 2,113.

FLUXING

Q.—Can you give us a receipt for a flux that will clean stereotype metal?

A.—Sal ammoniac is the flux mostly used for separating the oxide from the metal, which is principally lead oxide.

Other substances are mutton or beef tallow and common resin.

Raw potatoes will bring the oxide to the surface quite readily and is used to a great extent for the purpose. The potatoes that are used are the ones discarded for eating, but they should not be all bad. Place one or two pounds or more in a basket made from heavy iron wire with a handle to lift the basket from the metal. Weight down the basket containing the potatoes with pieces of heavy iron so that the potatoes are immersed below the surface of the metal. The heat of the metal will eject the moisture in the form of steam and this, together with the carbonizing of the potatoes, separates the oxide from the metal and brings it to the surface and it can then be readily removed by skimming.—C. H. P. Problem 2,114.

GRINDING

Q.—What is the proper amount of metal that it allowed on metal parts to be ground off on a disk grinder?

A.—The amount of stock that can be economically removed by disk grinding depends largely upon the nature of the material ground. Cast metal is more easily removed or ground than rolled or wrought material and small thin castings are usually harder to grind than larger or thicker castings owing to the greater density of the metal.

When castings have a hard scale it is often desirable to partially remove it before disk grinding. The hard scale is broken up either by grinding or vitrified wheels or by tumbling, sand blasting or pickling. The latter method is best for forgings or hot rolled material that has considerable scale. Cast brass parts should have an allowance of one-sixty-fourth to three-thirty-seconds of an inch.—P. W. B. Problem 2,115.

MACHINING

Q.—We are having trouble machining aluminum castings caused by the clogging of the chips between the teeth of the taps and thread chasers. We also get a rough surface on the bored or turned parts of the castings.

A.—This difficulty can be largely avoided by the use of the right kind of cutting lubricant and the correct method of grinding the tools used. Tools used for turning and drilling aluminum should have acute cutting angles. You probably have been using tools ground to cut brass. It is advisable to finish sharpening on an oil stone, as a keen edge is very essential.

Soap water and kerosene are commonly used as a cutting lubricant. The latter enables a fine finish to be obtained, provided the cutting tool is properly ground.

One of the largest manufacturers of aluminum parts in the country uses a lubricant composed of one part of Aqualine,* and 20 parts of water. This lubricant not only gives a smooth finish, but preserves a keen cutting edge and enables tools to be used much longer without grinding. Formerly a lubricant composed of one part of high grade lard oil and one part of kerosene was used, but this mixture costs approximately thirty cents per gallon, whereas the mixture of aqualine and water costs less than four cents per gallon and has proved more effective than the lubricant formerly employed.—P. W. B. Problem 2,116.

*Crescent Oil Company, 50 Church street, New York.

MIXING

Q.—Can you furnish us with a first-class mixture to be used for metal patterns? I want something that will stand wear and will not require much finishing before being put on the plates or gates.

A.—A mixture that can be recommended is as follows:

Copper	88 pounds
Tin	5½ "
Zinc	5 "
Lead	1½ "

The metal is not the main point to be given consideration in making castings to be used for patterns. The castings should be made by a skilled mechanic, and the best of materials should be used. First-class molding sand is one of the most essential things in turning out good smooth castings, and great care should be taken in melting your metal.

There is another point to take into consideration, and that is it takes time to get perfect work, and it cannot be expected to get first-class loose work at the same rate as a molding machine.—P. W. B. Problem 2,117.

PLATING

Q.—Please give us an up-to-date formula for brass plating zinc.

A.—The following formulas will give excellent results in brass plating zinc and they are practically the same as used by the Oakville Pin Company:

Still Solution.

Water	1 gallon
Copper cyanide	3 ounces
Zinc cyanide	¾ ounce
Sal ammoniac	½ to ¾ ounce
Cyanide of sodium	4¼ ounces

Mechanical Solution.

Water	1 gallon
Copper cyanide	4 ounces
Zinc cyanide	1 ounce
Sal ammoniac	1 ounce
Cyanide of sodium	6 ounces

The temperature of the solutions should be 70 to 80 degrees and the voltage for the still solution should be 4 to 5 and for the mechanical solution 6 to 8.

The solutions should be prepared as follows: Dissolve ¾ of the total amount of cyanide of sodium called for in ⅓ of the total amount of water required and this should be used at 200 degrees Fahrenheit. When dissolved add the copper cyanide, then add the balance of the ⅔ of cold water and add the sal ammoniac. You will now have an excellent copper bath as soon as it is tried out. Dissolve the remaining cyanide of sodium and zinc cyanide in as little boiling water as possible and then mix thoroughly with the copper solution previously prepared.

The water for dissolving the cyanide of sodium and zinc cyanide should be utilized from the ⅔ gallon of cold water. —C. H. P. Problem 2,118.

REDUCING

Q.—Can you tell us by what method equal parts of tin and lead, if melted together, could be reduced to powder form? Would the addition of either titanium or bismuth to these two metals cause this composition to assume powder-like form if poured into water when molten?

A.—The only method that we could advise for reducing tin and lead would be to make the mixture, roll the metal into sheets and then hammer it with honey in a stamp, as metal powders are made. The addition of titanium and bismuth would not help matters any.—K. Problem 2,119.

TARNISHING

Q.—We wish to obtain some kind of a solution or method whereby sterling silver can be prevented from tarnishing in windows and showcases.

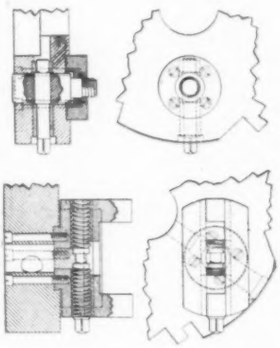
A.—We would suggest that you immerse your silver articles in paraffin oil and let them dry by the air and as the oil evaporates it will leave an infinitesimal film of paraffin wax upon the silver surface that will protect it from the sulphur vapors found everywhere in large cities. This is the only method we can suggest, except lacquering the articles, and this would be difficult for an amateur. Gum camphor placed in showcases where silverware is exposed for sale helps to keep the tarnish from silver considerably. It is used by many of the large silverware houses for the purpose and gives good results.—C. H. P. Problem 2,120.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY

1,125,054. January 19, 1915. **Turret for Metal Working Machines.** Robert S. Brown, of New Britain, Conn., assignor to New Britain Machine Company, of New Britain, Conn., a corporation of Connecticut.

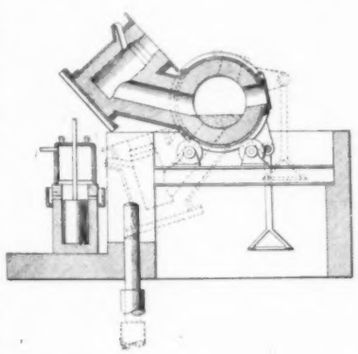
This invention relates to turrets for metal working machines, the object of the invention being the provision of means of a simple and effective character by which the cost of production of certain classes of work can be materially reduced.



At the present time with certain kinds of work, it is imperative to utilize two automatic or semi-automatic screw machines, the turret of one of these machines being equipped with means for supporting one kind of work, and the turret of the other machine being provided with means for carrying different kinds of work. By virtue of the improved organization, as shown in cut, the inventor avoids the use of two machines in this particular field and thereby saves the expense of carrying two of such machines as a part of shop equipment to obtain the products in question.

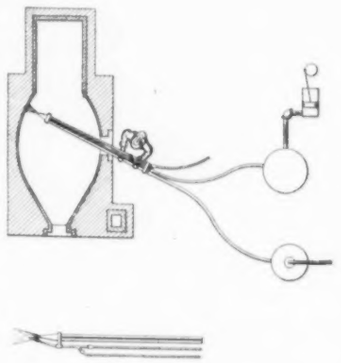
1,125,160. January 19, 1915. **Clad Metal and Process of Producing the Same.** William Marshall Page, of Ridley Park, and Wirt Tassin, of Chester, Pa.

This invention relates to clad metals and processes of producing the same; and it comprises a body of copper clad steel having a core or layer of steel weld united to a body or layer of copper having a high electrical conductivity, a good mechanical strength and a certain peculiar texture evinced on polishing and etching a section of such copper exhibiting a relatively coarse and flaky or platy macrostructure, free of visible lines of demarcation or cleavage between the component plates or flakes, such plates or flakes under the microscope appearing integrally united and each such plate or flake showing very small isometric crystals regularly arranged and having the same lines of orientation in any one plate though having different lines in adjacent plates or flakes; and it also comprises a method, as shown in cut, of producing such copper clad steel wherein a body of copper is treated while in a molten state by removing oxygen and oxids by solution therein of a more oxidizable metal, such as iron, and thereafter removing the dissolved oxidizable metal, and is thereafter weld united to a body of steel.



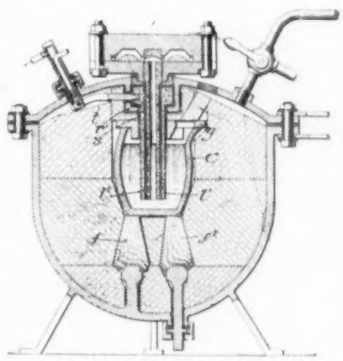
1,125,741. January 19, 1915. **Process of Forming and Repairing the Linings of Furnaces.** Alfred Schwarz, of New York, N. Y., assignor to New York Cement Gun Company, of New York, N. Y., a corporation of New York.

This inventor has discovered that a homogeneous lining of the requisite density may be produced by applying to the form or wall of a furnace, as shown in cut, comminuted refractory material at high velocity continuously or successively in relatively small quantities, and at the same time subjecting said material as it is thus applied to fusing temperature, thus furnishing successive thin layers of refractory material in heated and softened state into which the refractory material which follows is embedded, and building up a lining homogeneous and vitrified throughout. By subjecting the comminuted material to fusing temperature as it is applied to the furnace form or wall, a refractory lining is produced which is vitreous, dense and homogeneous throughout, thus producing effects, so far as density is concerned, like those of high pressures, and obviating entirely, or reducing to a minimum, the use of binders or adhesive agents such as would impair the heat resisting qualities of the finished structure.



1,126,079. January 26, 1915. **Casting Metals of High Melting Point.** Augustin Leon Jean Queneau, of Philadelphia, Pa., assignor by Mesne assignments, to Samuel P. Wetherill, of Edgewater Park, N. J.

This invention relates to the electrical casting of metals and more particularly to an electrical casting furnace adapted to produce finished castings from metals which melt at high temperatures such as brass, phosphor bronze, manganese steel and the like.



In carrying out the invention, the inventor maintained the casting metal in the fluid condition essential to the production of sound castings, by subjecting it to the heating effects of an electric current, and he maintains the casting nozzle, as shown in cut, which introduces the metal into the mold at a correspondingly high temperature, likewise by the heating effect of an electric current, applied either directly or indirectly.

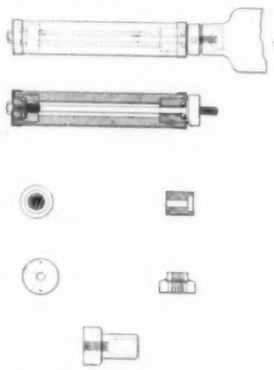
1,126,211. January 26, 1915. **Process and Means for Securing Metallic Coats on Ceramic Surfaces.** Leo Hiller, of Tiplitz, Austria-Hungary.

This invention relates to the application of metal to ceramic bodies, and its object is to provide an improved process and means for causing metallic coats to adhere firmly on the surfaces of ceramic objects, such as those of porcelain, glass, terracotta, stoneware and the like.

The improved means consists of a mixture of approximately 5 parts linseed oil, 5 parts turpentine oil, 250 parts boneblack, 180 parts rosin and 420 parts chemically purified finely divided graphite. These ingredients are intimately mixed in a color-mill until the composition is adapted to be applied like a paint by a brush or the like on the ceramic surface.

1,101,654. June 30, 1914. **Buffing-Handle.** J. H. Miller, Wellsburg, W. Va.

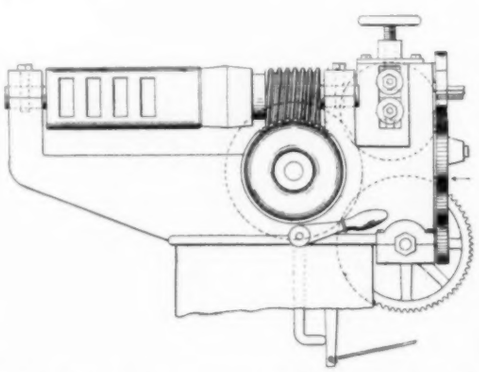
Heretofore in buffing and polishing the outside of metal cans, parts of lamps, and other hollow metal articles, it has been common to use a handle having a metal rod extending therefrom, the metal rod being inserted in the mouth of the can or other article, which being supported thereby is presented to and held against the revolving buffing surface, the can rotating on the rod. This is crude, the work is imperfectly done, and skilled labor is required. The object of this invention is to provide a tool, which will hold the can or other article firmly, and to allow it to rotate freely and evenly when it is brought in contact with the buffing surface. To this end it consists in a tool, shown in cut, composed of a revoluble rod mounted in ball bearings in a casing, and a removable head or holder adapted to fit in the mouth or neck of the article to be buffed and to hold the same securely during the buffing operation.



1,126,892. February 2, 1915. **Wire-Straightening and Cutting-Off Machine.** E. F. Shuster, New Haven, Conn.

The invention relates to wire straightening and cutting off machines, and it consists of an arrangement of mechanism, as shown in cut, for driving all of the rotatable parts of the machine by means of a single belt drive directly from the straightening arbor.

The object of the invention is to eliminate a plurality of the countershafts, pulleys and gears heretofore employed on machines of this character, besides enabling the machine head to be greatly reduced in width and a corresponding reduction in the cost of construction.



The inventor claims: In a machine of the character described having a head, a straightening arbor rotatably mounted therein, feed rolls, and a cam shaft for actuating a cutting off lever, a worm mounted on the straightening arbor, a driving shaft journaled transversely in the head, a worm gear on one end of said shaft meshing with said worm, a train of gears connecting the driving shaft, one of the feed roll shafts and cam shaft, the gear on said cam adapted to run free during the wire feeding operation, and means for connecting said gear with the cam shaft.

1,127,624. February 9, 1915. **Alloy.** G. C. Holder, Altoona, Penn.

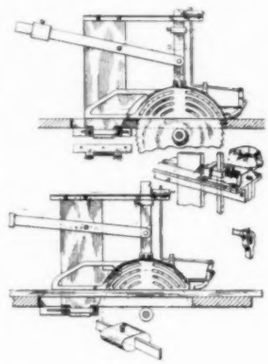
The present invention consists in a novel alloy, of which nickel, lead and copper form the main constituents.

The novel alloy is especially intended and adapted for use as a material out of which to form metallic rod packing rings, suitable for use on the piston rods of locomotives employing superheated steam, and under similar conditions. A material suitable for the purpose specified must have a melting point sufficiently high to withstand the maximum temperature to which it is exposed, and should be soft enough not to cut the rod to which it is applied, and to take a bearing thereon immediately upon application; and, on the other hand, should be hard enough to prevent its own too rapid attrition.

The percentages of nickel, copper and lead in the alloy may vary with conditions, as follows: nickel, 3 to 9 per cent.; copper, 20 to 30 per cent.; and lead, 61 to 77 per cent.

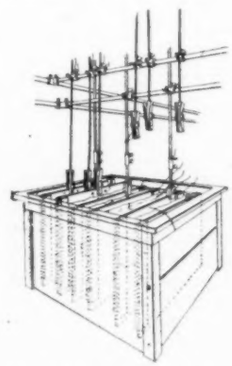
1,127,509. February 9, 1915. **Automatic Safety Saw Guard.** F. W. Pleasance, Cleveland, Ohio.

This invention relates to saw guards for circular saws, and has for its object to provide an improved guard provided with a locking device shown in cut, which locks the guard in closed or safety position except when a piece of board or other material is presented to the saw, when by means of a trigger the lock is released and the guard is permitted to lift to the extent necessary to allow the board to pass thereunder, and after it passes, the guard drops and is automatically locked again until the next operation. The guard therefore remains in locked position except when the saw is in use.



1,129,241. February 23, 1915. **Electro-Plating Apparatus.** Chris N. Smith, of Elgin, Illinois, Assignor of one-half to David C. Cook Publishing Company, of Elgin, Illinois, a corporation of Illinois.

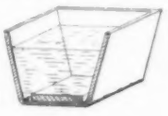
This invention relates to certain improvements in electro-plating apparatus, and the object of the invention is to provide a device of this general character wherein the anodes and cathodes may be applied within or removed from the vat with convenience and facility and whereby the same may be manipulated in a manner to reduce to a minimum the possibility of foreign substances being collected within the vat whereby such vat is maintained clean.

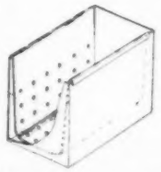


Referring to the cut, it will be observed that the anodes and cathodes can be positioned with facility and convenience at any predetermined point within the vat and that the same, especially the cathodes, can be raised and lowered with the best advantage. It is also to be observed that by this arrangement the vat is substantially destitute of accessories or adjuncts, whereby an unhampered flow of current is afforded. It will also be observed that with the foregoing arrangement the anodes and cathodes can be manipulated with greater convenience and facility, as there is but one point of contact with each of the same to consider.

13,880—Original 937,154. Reissued. February 16, 1915. **Method of Removing Tarnish from Metals.** M. H. Keyt, Chicago, Ill.

The invention relates to a process or method of brightening metals by removing tarnish therefrom, and consists in the apparatus as shown in cut. Primarily, the method consists in immersing the metal from which the tarnish is to be removed in an electrolyte in which is immersed a metal of a more positive electrical character. The method is applicable in brightening all kinds of metals, but for the purpose of illustration it is described in the patent in the removal of tarnish from silver.





The inventor claims: A process for removing tarnish from metals, consisting in removing tarnish or corrosion from a portion of the surface of an electrode having a more positive electrical character than the metal to be brightened, placing said electrode and the metal to be brightened in an alkaline electrolyte, and in establishing electrical connection between said surface from which the tarnish has been removed and the metal to be brightened.

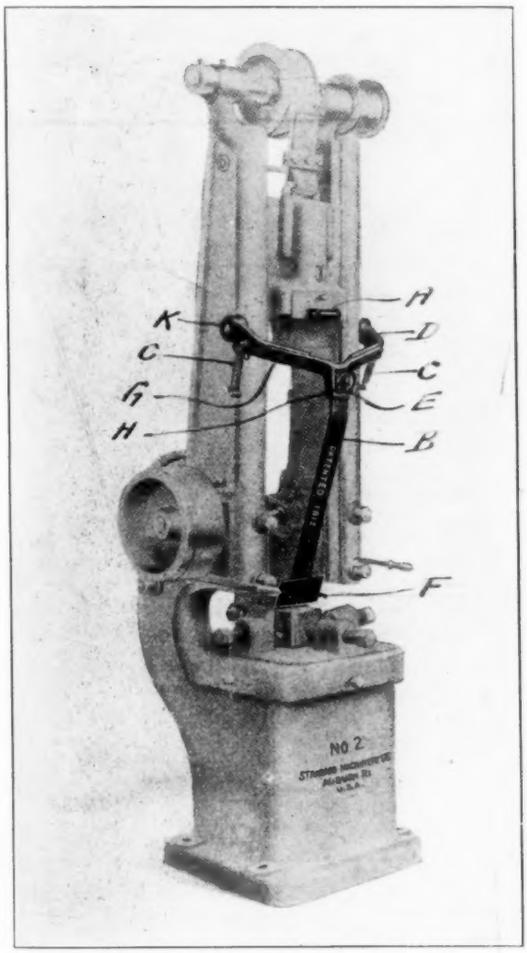
EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

DROP HAMMER SAFETY DEVICE

The device shown in the cut is intended to be used on any plain, automatic or board drop hammer where it is necessary for the hands of the operator to place the work to be done on the die. The essential feature of this device is that when the hammer is at the high point the work is placed upon the die, and the fan or blade of the device is in the back of the die toward the rear of the hammer.

As the hammer descends the roller indicated as part "A" comes in contact with the inclinable blade marked as "B," thereby pushing the operator's hand from under the hammer. There are two springs marked "C," which pull the safety



DROP HAMMER SAFETY DEVICE.

device back into the original position, as shown in the half tone when the hammer rises. No matter what happens to the mechanism of the hammer, the operator's hand is pushed away from the danger point every time the hammer descends; this function occurs whether the belt breaks, whether the eye in the hammer breaks, or whether any part of the working part of the machine is injured that would cause the hammer to descend.

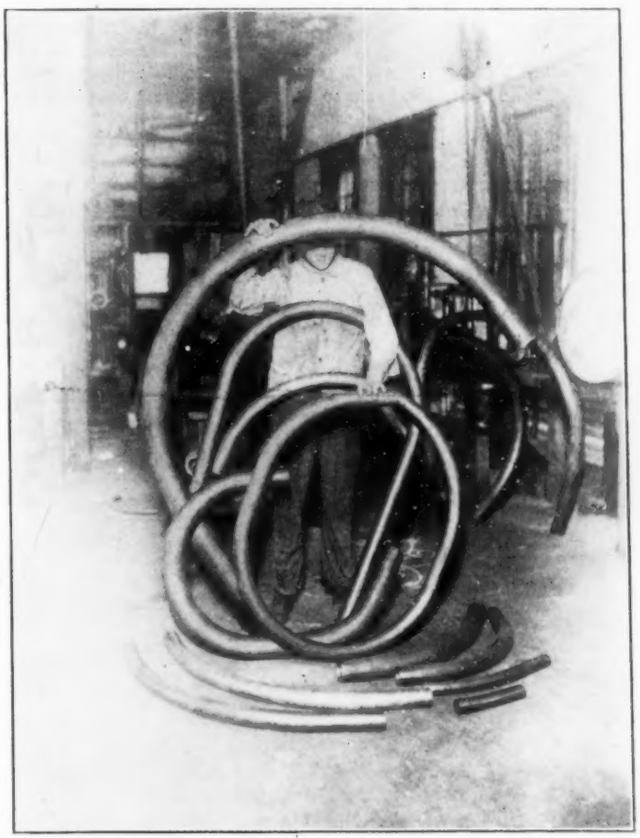
In addition to the parts mentioned above the device consists of a right and left-hand bracket, marked "D" and center bracket "E"; also fan or blade "F"; at point "G" are two screws which work into slotted holes; this permits an adjustment for width, i. e., allowing the device to be applicable to different sizes of hammers and different widths. At point "H" are hexagon screws which work in slots which allow the blade "B" to be raised up and down and which accommodate the different heights of dies. The entire device swivels on pins marked "K," which are studs put into the side of the frame.

This device is manufactured by the Standard Machinery Company, manufacturers of presses, rolling mills, etc., Auburn, R. I.

TUBE BENDING MACHINE

The machine shown in the cut represents the latest improved motor driven pipe and tube bending machine now being manufactured by the J. Fillmore Cox Company, Bayonne, N. J. This machine in its original form was described in the January issue of THE METAL INDUSTRY for 1910.

One of the improvements that have been made in the operation of this machine is the use of a 5½ h.p. General Electric motor of

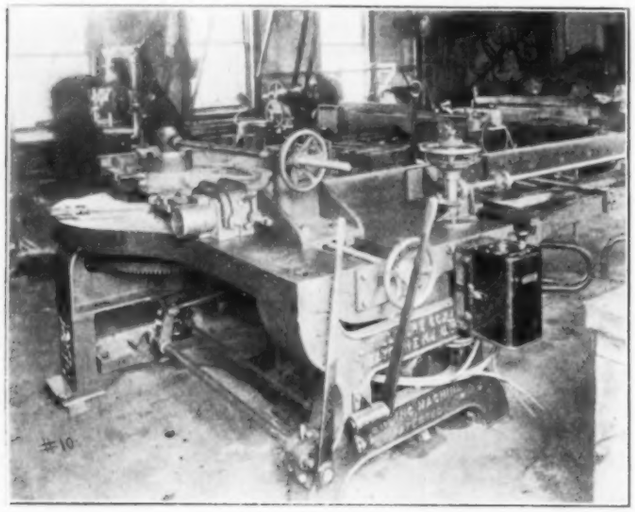


VARIOUS KINDS OF BENDS MADE ON THE COX MACHINE.

the variable speed reversible type together with a drum type controller, an equipment which has been found to be very satisfactory and particularly flexible. The machine operates on any shape pipe or tubing, making any shape or style of bend, as well as on flats, squares, solids, channel, beam sections, etc. Any kind of metal may be bent, such as copper, brass, bronze and aluminum. Some of the particular applications of this pipe bend-

ing machine include automobile manifolds, exhaust pipes, front fenders, etc., ship, locomotive and car work bends, brass bedsteads, boiler tubes, ornamental street lighting, super-heaters and power plants.

These machines are built in a number of sizes and types which bend cold and operate on all sizes and gauges of metals. With the

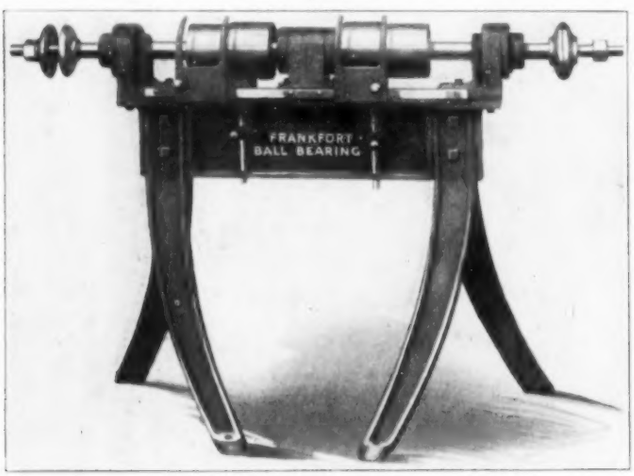


THE NEW COX TUBE BENDING MACHINE.

full attachments fitted to a machine several bends may be produced at the same time, each being of a different nature, and when used in connection with the magazine arrangement produces radial bends entirely automatically, it only being necessary to place the material in the machine cut to proper length and each bend will be an exact duplicate of the other. Further information relating to this very efficient tube bending machine may be had by corresponding with the above company.

BALL BEARING POLISHING LATHE

The illustration shows a ball-bearing twin spindle double end polishing and buffing lathe equipped with S. K. F. double row self-aligning ball bearings. The lathe is manufactured by the Strong, Carlisle & Hammond Company, of Detroit, Mich., and is recommended as an efficient, durable machine and with this type of bearing operating at high speed, it is claimed to outlast



A BALL-BEARING POLISHING LATHE.

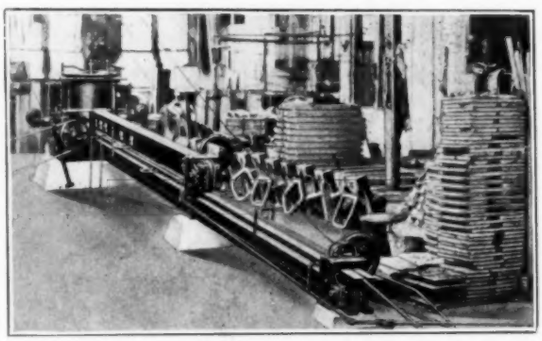
plain babbitt bearings many times, as well as effecting a great saving in power.

It is impossible to cramp or wedge the spindle, as the bearings will instantly align themselves to the slightest deflection an equally distribute the load or pressure. Each bearing is mounted in a dustproof housing provided with ample oil reservoir and two felt washers on each side. The spindles are operated individually or simultaneously without hindrance to either operator. Each spindle is fitted with tight and loose pulleys perfectly balanced. Loose pulley is turned a trifle smaller in diameter to relieve the belt tension when not in use. Spindles are provided with an automatic self-locking brake. When belt is shifted on to the loose pulley the brake acts automatically upon the tight pulley, and at the same time securely locks the belt shifter. This feature protects the operator from creeping belts when changing wheels. Spindles are made of high carbon steel, accurately ground and threaded. The legs of this machine are curved to permit of a convenient working position for the operator, also facilitates the handling of long and irregular shapes of work.

MELLEN ROD MACHINE

It is interesting to note what the present war brings forward in the line of invention and manufacture. The Continuous Casting Corporation, of Newark, N. J., which has been placing on the market the Mellen Rod Machine for the continuous casting of brass, etc., is now busily engaged building lead rod machines for certain foreign concerns.

This machine supplies enough rod when using a three-bore chain to stamp out 165,000 bullets per hour per machine. Due to the low melting point of lead, little trouble was experienced even



THE MELLEN CONTINUOUS ROD CASTING MACHINE.

during the first stages of this machine's operation. Many mixtures were cast, the alloys being ½ per cent. antimony and upwards, with occasional additions of tin. Today the minor difficulties experienced with alloys have been overcome and a commercial rod from ¼ inch in diameter and up can be produced.

The Mellen Rod Machine for lead is of the horizontal type, as shown in cut. That is, the bore of the machine is parallel with the floor. The continuous casting molds form, convey and deliver the solid lead rod in a horizontal plane. This entire operation requires but a 3 h. p. motor.

Any suitable size or shape molds may be used. Depending upon this and on the number of casting bores, the capacity is determined.

The actual cost of operation is less than 30 cents per ton from the state of the molten metal to that of the cast rod.

The floor area occupied is approximately 3 x 25 feet, which includes space for the reels at one end where the rod is coiled and carried away for further treatment.

NEW ALUMINUM SOLDER

The German-American Aluminum Company, which has just established a sales office at 25 West Forty-second street, New York City, is now putting on the market its new aluminum solder.

The new solder is the invention of Karl R. Peters, a metallurgist of Berlin, Germany, and at the present time it is being manufactured in this city as well as in that country. The inventor claims that no breaks are too complicated to be repaired by the new method and that the work can be done at a saving of at least one-third the cost of the welding job. The strength of the solder, according to Mr. Peters, is about double that of aluminum as regards its resistance to tensile strains and even greater as regards its resistance to bending.

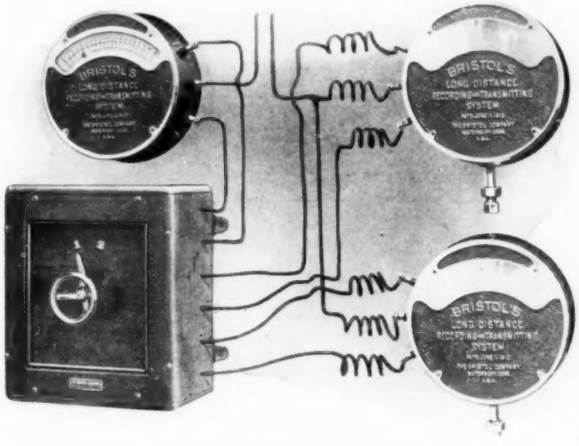
NEW BRISTOL ELECTRIC TACHOMETER

The field of usefulness for Recording Tachometers includes use in connection with all engines, machinery or revolving shafts wherever information is desired about the rate of speed at which shafting or any other devices are revolving. Some of the most important applications are in connection with engines, turbines, generators, paper machines, blast furnace, blowing engines, motors and pumps. Recording Tachometers are usually required for continuous service under ordinary shop or mill conditions and for this reason must be made rugged and durable to be thoroughly successful. A new Bristol's Electric Tachometer of the A. C. type which is

BRISTOL TACHOMETER SHOWING INDUCTION MAGNETO.

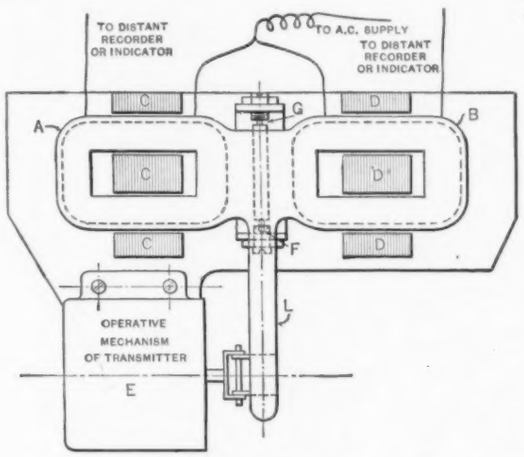
particularly well suited to rough operating conditions in mills, power plants or shops is being put on the market by The Bristol Company, Waterbury, Conn. Although this is an electric tachometer no sliding contacts or brushes are used in it and no delicate millivoltmeter movements are required.

Two of the most important features of this Electric Tachometer which makes it particularly strong and durable are: First, the induction magneto, and, secondly, the voltmeter



A BRISTOL RECORDING ELECTRIC TACHOMETER OUTFIT.

movement. The magneto as shown in the accompanying illustration is of the induction type without any sliding contacts or brushes. The indicating and recording instruments are voltmeters. The indicating instrument is equipped with a Weston pivot jewel bearing voltmeter movement. The recording instrument is equipped with an improved Bristol voltmeter movement so designed that there is plenty of power available for actuating the recording arm even though the recording pen is in continuous contact with the surface of the chart. In this recorder the movement is mounted on frictionless knife edge bearings. This movement is equipped with a new patented supporting device for the moving elements designed to eliminate temperature error. This recorder can be furnished for use with either 12 inch, 8 inch or 6 inch charts. The accompanying illustration shows a combination indicating and recording unit which provides an indicating instrument for the operator at his post of duty



INTERIOR VIEW OF TACHOMETER SHOWING SOLONOIDS.

and a recording instrument for the superintendent or foreman in his office. Suitable lengths of leads can be furnished for locating either instrument almost any desired point. Connections can be furnished for more than two instruments if desired. A simple form of this tachometer can also be furnished either with the indicator alone or the recorder alone.

FLEXIBLE SHAFT DRILLING TOOL

The machine shown in the cut is the new general utility drilling tool now being manufactured by the Stow Manufacturing Company, Binghampton, N. Y. This tool is motor driven and is operated, as can be seen from the picture, by a flexible shaft. The tool is also furnished in the suspended type, which eliminates the pedestal and furnishes a tool that takes up no floor or bench room and is within easy reach of the operator. The motor shaft combination is so constructed that it is furnished for any desired speed the user may require, between 400 and 7,000 r. p. m. It is fitted for die sinking and drilling, for buffing and grinding, or with screw driver attachment which is optional to the purchaser. Motors furnished with this combination are constructed to operate direct from a lamp socket. These tools take their power from the nearest electric light socket and are supplied with motors for use on either alternating or direct current circuits at potentials of 110 or 220 volts.

THE STAR DRILL.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE METAL INDUSTRY ORGANIZATIONS.

AMERICAN ELECTRO-PLATERS' SOCIETY

The Broadway Central Hotel, 673 Broadway, New York City, was the scene on Saturday, February 20, 1915, of the sixth annual banquet of the New York and Newark Branches of the American Electro-Platers' Society.

As usual, this gathering was successful, both in point of numbers and interest displayed in the subject acknowledged to be the reason for the gathering, i. e., electro-plating. Over two hundred platers and their friends were to be observed wandering about the hotel from early afternoon until after midnight. A notable array of exhibits were arranged for by the members and about the only comment that could be made about the exhibit is one of regret that more platers did not take advantage of the opportunity offered to show their products. Among the interesting things shown were the following: Samples of steel plates, etched by the use of the transfer method—polished and nickel plated with dead white nickel background, also plain plates highly polished and nickel plated, by Edward W. T. Faint, Singer Manufacturing Company, Elizabeth, N. J.; shoe, very fine bronze powder and lacquer sprayed on shoe and copper deposited; engraving, copper etched plate, silver inlaid, by H. H. Smith, Tiffany Company, Forest Hill, N. J.; stove work, showing the possibilities of procuring high finishes on iron castings by polishing and nickel plating direct on the iron, by L. H. O'Donnell, W. M. Crane Company, Jersey City, N. J.; section of a metal pneumatic carrier in oxidized finish, by W. E. Symonds, Lamson Carrier Company, Lowell, Mass.; nickel and brass plate on zinc, by W. S. Elwin, C. J. Root Company, Bristol, Conn.; samples of polishing compounds and results, including Argental alloys, by Henry Ringhof, Newark, N. J.; sprayers and finishes, Eureka Pneumatic Spray Company, New York, N. Y.; finishes on cash registers, by Tuttle & Bailey Manufacturing Company, Brooklyn, N. Y.; fancy finishes on brass and other metals by H. C. Bernard, Newark, N. J.; metallizing, by Rocky Massicotte, Kathodian Bronze Company, New York, and fancy finishes, by Thomas Haddow, August Goertz & Co., Newark, N. J.

The banquet, which was the principal event scheduled for the day, took place in the evening was attended, as can be seen by referring to the picture shown on the opposite page, by the representative platers and platers' supply men of New York and vicinity.

After the food for the inner man had been stowed away safely by the diners, Toastmaster De Joannis introduced Professor J. W. Richards, secretary of the American Electrochemical Society, who made a short address relating to the electro-chemistry and electro-metallurgy of olden times. Dr. Richards said that it was a curious significance that the early books were entitled electro-chemistry and electrometallurgy and they did not contain hardly anything but electro-plating, while more modern works contained all electro-chemistry and electroc-metallurgy and no electro-plating. This condition of affairs he attributed to the fact that the early books were published before the time of the dynamo and consequently much experimenting in electro-chemistry and metallurgy could not be indulged in. The first book that he mentioned was one by Dr. Smead, the inventor of the Smead cell.

Dr. Richards was followed by Mr. A. K. Selden, of the Crocker-Wheeler Electric Company, Ampere, N. J. He gave a brief talk on the modern dynamo. Mr. Selden was followed by Dr. Hiram Lukens, of the Harrison Chemical Laboratory of the University of Pennsylvania, Philadelphia, Pa. He, in an entertainingly and interesting manner, detailed instructions for the electrolytic determination of the amount of metal in various plating solutions. A synopsis of Dr. Lukens' remarks were as follows:

Dr. Lukens' remarks consisted of some practical advice as to the possibility for the plater to accurately and effectively determine the amount of metal in his solutions. Dr. Lukens stated that when a plater had a solution in the proper condition to work it was a simple matter for the plater to use a portion of the solution and make a determination of the metal content. He stated that the simplest and best method that he would advise for this purpose involved the use of a small platinum dish together with a spiral made of platinum wire. The wire and dish are carefully weighed and then the dish is made the cathode of an electric circuit, while the spiral becomes the anode.

A measured quantity of the solution from the plating bath is then carefully placed in the dish, the spiral is lowered into the solution until it nearly touches the bottom of the platinum dish. The electric current is then turned on and the copper or nickel, as the case may be, is deposited upon the inner surface of the platinum dish. After the current is conveyed through the solution for a suitable length of time, varying with the amount of solution and proportion of metal in it, the dish is thoroughly washed first with water and then with alcohol, the alcohol being evaporated with gentle heat and the dish is finally weighed. The difference between the first and last weights giving, of course, the amount of metal deposited from the solution.

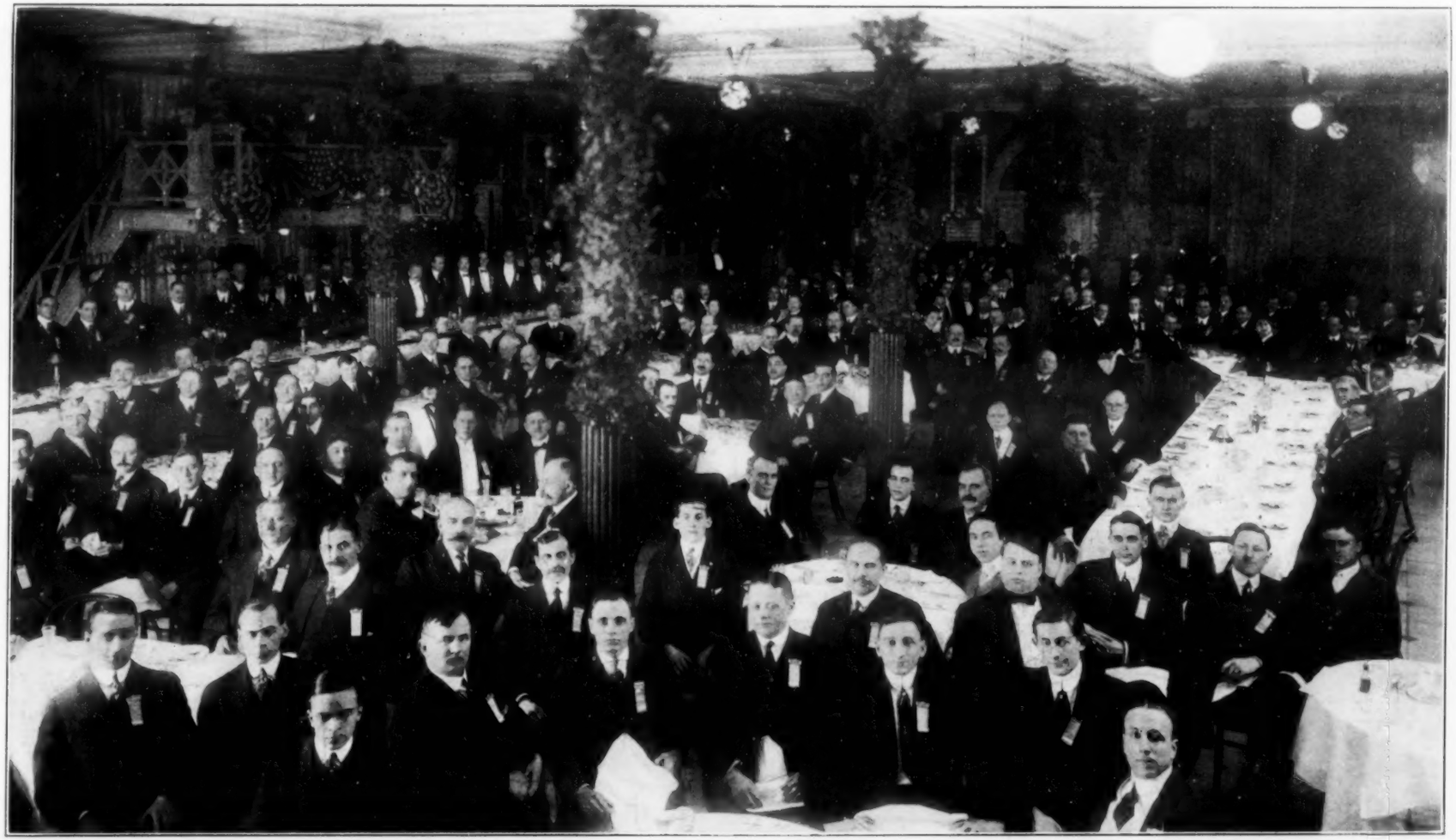
Dr. Lukens stated that in the event of the apparatus described above being found too expensive for a plater to obtain, that there had been devised at the Harrison Laboratory a small apparatus which was very much cheaper. This consisted of a small glass vessel, through the bottom of which a small platinum wire had been fused. A weighed portion of mercury was introduced into the vessel or the whole apparatus containing the mercury and the platinum wire were weighed before conducting the operation.

A measured quantity of the solution to be tested is then introduced into the receptacle and remains on top of the mercury. The mercury in this case becoming the cathode of the electric circuit. As in the former process a platinum wire is employed for the anode and this dips down into the solution, but does not touch the mercury at the bottom. After the current has been run for a suitable length of time the copper or nickel will have been deposited from the solution and amalgamated with the mercury. This amalgam may either be taken out of the apparatus, washed and carefully weighed, or the apparatus itself after being washed may be weighed and the gain in weight in either case will give the amount of metal taken from the solution. Considerable interest was manifested in Dr. Luken's description of these methods of determination and at the close of his address a number of questions were asked by the platers present.

At the close of the speaking a short session was devoted to the asking by the members of questions of Dr. Lukens relating to the method of analysis that he had outlined. This demonstration will show clearly the trend of the minds of the platers present; that is, that they are constantly seeking knowledge and willing to go to any length to render themselves more efficient in their chosen vocation.

Not the least interesting incident connected with the platers' banquet was the interest displayed by the supply platers, and this was evidenced by the number of souvenir distributed. The following were represented: Maas & Waldstein, New York City, furnished the badges; Celluloid Zapon Company, New York City, presented penknives; Henry Ringhof, Newark, N. J., pipe cleaners; The Egyptian Lacquer Company, New York City, cigars; Eureka Pneumatic Spray Company, also of New York City, celluloid match cases, and THE METAL INDUSTRY, the registration.

New York Branch.—The regular monthly meeting of this branch was held Friday, February 27, at the newly fitted up rooms of the society, 262 Pearl street, New York. The members are greatly pleased with the place and hope very soon to have a laboratory completely fitted up, and then facilities will



SIXTH ANNUAL BANQUET OF THE NEW YORK AND NEWARK, N. J., BRANCHES OF THE AMERICAN ELECTRO-PLATERS' SOCIETY.

be afforded for experiments and demonstrations. The initiation fee for joining this branch has been raised from one to five dollars, and from this source it is hoped to defray the expenses of the outfitting of the laboratory.

Cleveland Branch held its regular semi-monthly meeting on February 13, 1915. This branch in the near future expect to have an open meeting for manufacturers, superintendents and foremen platers to acquaint them with what the branch is doing for the plater. The regular semi-monthly meeting of this branch is held every second and last Saturday of the month at the Central Y. M. C. A.

Toronto Branch held its February meeting on Thursday, February 25, 1915, with President John A. Magill presiding. A bound volume of THE METAL INDUSTRY for the year 1914 was laid on the table with the compliments of the publishers, and a hearty vote of thanks was extended to them for their kindness in presenting the same to the branch. After the regular routine business had been disposed of, W. S. Barrows spoke briefly on "Specialization," and a paper on "Job Shop Routine" was presented by one of the members. The members of this branch have been attending a class in the Toronto Technical High School during the winter evenings, devoting the time to learning the analysis of silver and nickel solution and the determination of the various acids, cleaning agents, etc.

Detroit Branch.—This branch held a very successful and interesting smoker on January 23, 1915. There were 65 present and talks were given by Messrs. Schulte and Cequin on the progress of the Detroit Branch and on the benefits of membership in the Electro-platers' Society.

DEMONSTRATION OF METAL CYANIDES AT LEWIS INSTITUTE, CHICAGO, ILL.

On February 11, 1915, about 300 chemists, engineers and practical platers, members of the American Chemical Society, American Electro Chemical Society, and the American Electro Platers' Society, met at the Lewis Institute, Chicago, Ill., to attend a demonstration and lecture on the metal cyanides. Prof. Woodworth, of the Lewis Institute, opened the meeting by stating that the institute had long realized the scope of the electro-plating industry and had therefore arranged this meeting so that the practical plater and the technical man could meet and discuss electro plating both from a practical and theoretical standpoint.

The next speaker was Carl Dittmar, of New York, who read the following paper:

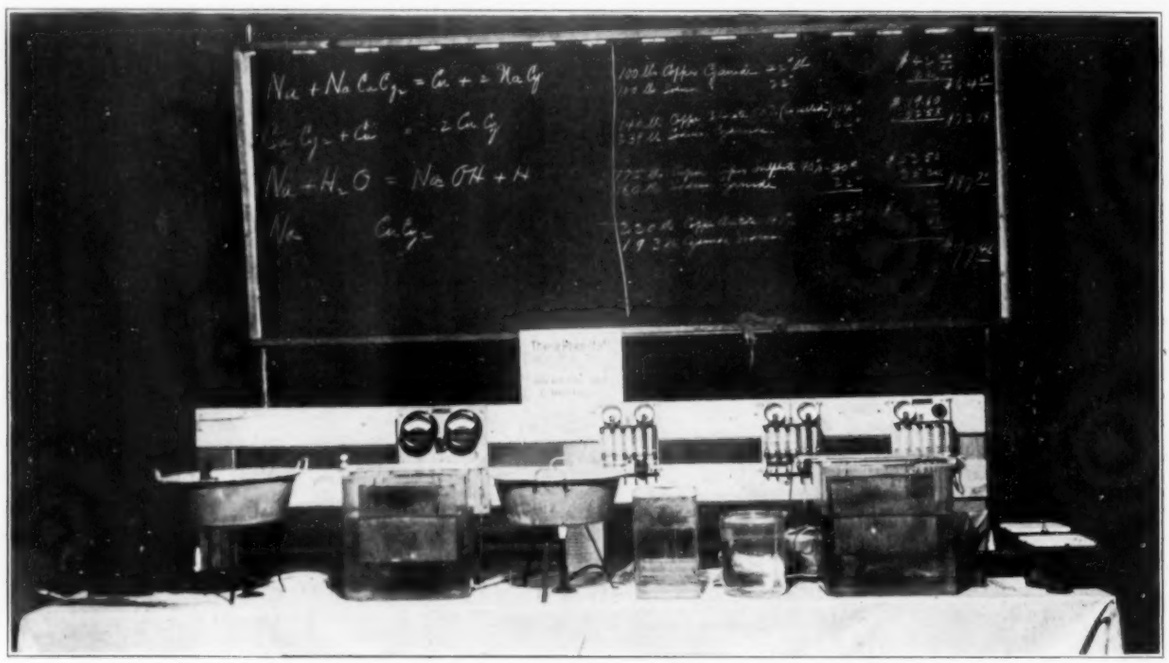
THE ADVANCE OF THE PLATING INDUSTRY

The plating industry has grown steadily each year and now its scope is considered almost unlimited. This fact is causing the manufacturer and the technical man to pay more attention to the branch of industry than ever before. With this growth competition has grown keener, which, in turn, has drawn the attention of the efficient expert to the plating department.

There is hardly a large manufacturing plant where a cost system has not been introduced to determine the cost of operating the plating department. The manufacturer has called for increased output and in order to enable the plater to meet this demand has installed modern equipment. He has installed high efficiency electrical apparatus. The plating barrel or mechanical plating tank was installed and is steadily growing in favor as it enables the plater to handle a large amount of work at one time, thus reducing labor cost. Only the most important part of the electro plating department has been neglected—the solution itself. The expense and possibilities of the electroplating field has now drawn the attention of the technical man to this most vital part of the electro plating industry.

It is only during the last few years that the chemist has been consulted. That electro plating is simply a branch of electro chemistry and a very important one, was recognized for the first time when the American Electro Chemical Society gave a symposium on electro plating at their meeting at Atlantic City in April, 1913, to which the American Electro Platers' Society were invited. This was the first meeting of the practical and theoretical man for the purpose of discussing electro plating problems and that meeting has done more toward dispersing the prejudice which the practical plater has had against the chemist, whom he considered nothing short of a "Meddler." The plater now looks upon the chemist as a friend who can help him out of the difficulties which present themselves from day to day. Another step in this direction has been taken by the Bureau of Standards at Washington, which has undertaken to standardize acid plating solutions and it is only a question of time when the matter of alkaline or cyanide solutions will receive the same consideration. Now this institution, recognizing the unlimited scope of the electro plating field, has taken the initiative of bringing the matter before its students. This is beiug done for the sole purpose of increasing the efficiency of the plating solutions. In order to obtain maximum efficiency in the plating department the plater must be positive that the solution has been made up not only most economically, but with materials which will assure perfect deposits in the shortest possible time.

The plater is now working in harmony with the chemist. He is becoming more intimately acquainted with his solutions. He wants to know what he can expect of his bath in a given time. In order to be able to do this, however, there must be eliminated from the plating solution not only detrimental matter, that is, material which actually retards the action of the current, but also that which does the solution no good. He must eliminate all ingredients which lie dormant in solution and confine himself only to materials which serve a specific purpose. All he draws from his solution is metal, and this factor should, therefore, receive the most consideration.



THE OUTFIT USED FOR DEMONSTRATING METAL CYANIDES AT LEWIS INSTITUTE, CHICAGO, ILL., FEBRUARY 11, 1915.

The next consideration is the electrolyte, which reduces the metal from the anodes and deposits it upon the cathode. It is a fundamental rule in electro chemistry, that the best results are obtained only when purity of materials is combined with simplicity of application, and it is the object of this demonstration to point out to the chemist and the plater alike, that this ideal condition can be arrived at by the use of metal cyanides.

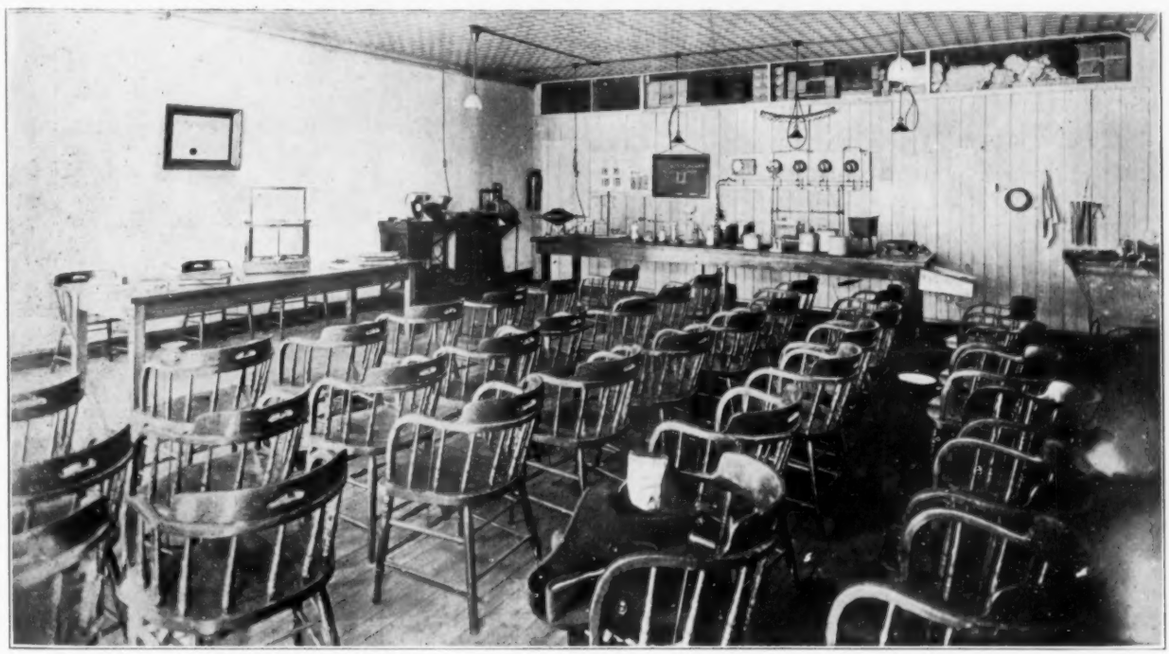
Dr. Max G. Weber next presented a paper discussing copper cyanide plating solution, from a theoretical standpoint. (This paper will be found elsewhere.) Mr. C. H. Proctor then gave a practical demonstration of brass and copper solutions and spoke on the efficiency and economy of the metal cyanides for the preparation and maintaining of such solutions. A lively discussion of the papers presented followed.

The Lewis Institute has arranged to publish the papers in question in pamphlet form, copies of which may be had by addressing Prof. Woodworth, in care of the Lewis Institute, Chicago, Ill.

THE NEWARK ELECTRO-PLATERS' SOCIETY

An educational society, which, during the past year owing to its continued growth, has created considerable interest among technical men and manufacturing concerns of Newark, N. J., who come in contact with problems dealing with the electro-deposition of metals is the Newark branch of the American Electro-Platers' Society. The rapid progress made by this society is in no small measure due to the untiring efforts of its president, Horace H. Smith, and his subordinates, who after considerable work have caused the Newark branch of the parent body to become practically foremost of the fourteen branches now in existence.

The Newark branch of the American Electro-Platers' Society was granted its charter on May 2, 1913, by the parent body located in New York, at which time its total enrollment consisted of twenty members from whom officers were chosen as follows: Horace H. Smith, president; John Hartwett, vice-president; C. A. Stiehle, financial secretary and treasurer; Clarence O. Field, recording and corresponding secretary. The society held semi-monthly meetings at the G. A. R. Hall, No. 833 Broad street, Newark, N. J., where



MEETING ROOM AND CHEMICAL LABORATORY OF NEWARK BRANCH OF THE AMERICAN ELECTRO-PLATERS' SOCIETY AT NEWARK, N. J.

papers on various subjects pertaining to the preparation and maintenance of electrolytes and the results of various solutions tested were discussed. It had for some time been the aim of the society to procure quarters in which a laboratory could be installed, where experiments and tests could be made, but owing to its small membership and the lack of funds such plan was prevented from becoming a reality.

On September 4, 1914, due to the continued efforts of Mr. Sievering, together with the assistance of several members, rooms were procured at 49 Bank street, and through the generosity of various individuals and manufacturing concerns interested in the welfare of the society it was the recipient of a fully equipped laboratory and the following apparatus: Control board containing Waverly voltmeter, ammeter 0 to 50 amperes; rheostats; glass tank, 9¼ x 10 x 12; storage battery, 6 volts, 100 ampere per hour; electro-polishing lathe; 60 cycle, single phase, 110 volts; sand blast; motor polisher, and complete material for the testing of solutions, plating of metals and the application of various finishes, etc.

The society is composed of foreman platers and chemists and has a membership at the present time of fifty-one active and four honorary members. Meetings are held on the first and third Friday of each month, at which papers are frequently presented by authorities on various branches of electro-plating; tests are made of different solutions and demonstrations are given with respect to the utilization of same. Platers who encounter difficulties in the discharge of their daily duties make same known and discussions are had thereon, with the result that much useful assistance is derived in this manner. The society's rooms are at the disposal of its members at all times, where they may enjoy an evening of amusment with fellow members, or attempt to solve problems with which they have been unable to cope during business hours.

The Newark branch has arranged a general program of subjects to be treated during the next several months, the first of which to be given consideration is that of the study of copper, an outline of which is briefly summarized as follows:

(1) History, source, method of refining; electro-typing, electro-deposition, and its application, etc.

(2) Solutions of copper acid, alkaline, cyanide, conducting salts and method of introduction.

(3) Coloring of deposits by means of electrolytes, by immersion, heat, friction, etc.

(4) Finishing, preservation of colors and durability of same.

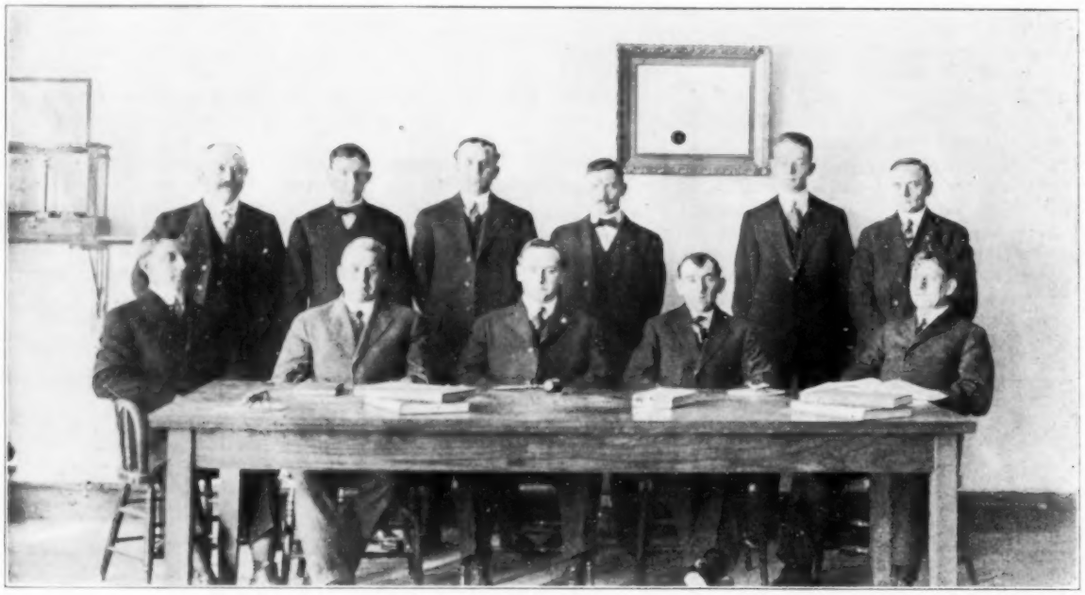
(5) Determination of metal content in electrolytes as follows: (a) Simple and quick method. (b) Exact and chemical determination; (c) Determination by the electrolytic method.

There is now in course of preparation a special programme to be presented at an "open meeting," to be held on Friday, March 19, 1915, and the society extends a cordial invitation to all gentlemen interested in electro-plating and its various branches to attend this meeting with a view of not only obtaining information which may prove beneficial to them in the discharge of their daily duties, but of also inspecting its laboratory and apparatus. Among the gentlemen who have kindly consented to lend their assistance on this occasion are Professor J. W. Richards, of Lehigh University, who will deliver an address on the "A B C's of Electro-Plating," and Mr. King who will discuss and give a demonstration of bright nickle. Other contributions will supplement those of the above mentioned gentlemen, which it is expected will also prove of interest.

With the interest shown and the efforts put forth by its

members, together with the co-operation of manufacturing concerns the future success and growth of the Newark branch of the American Electro-Platers' Society is in no small measure assured.

Any foreman plater or chemist wishing further information may apply to any of the following officers: President Horace H. Smith, 11 Terrace Place, Belleville, N. J.; Vice-President John Hartnett, 199 Sussex avenue, Newark; Financial Secretary and Treasurer C. A. Stiehle, 46 W. Madison avenue, Irvington; Recording Secretary Edward W. T. Faint, 256 Westfield avenue, E. Roselle Park; Libarian L. H. O'Donnell, 163 Lembeck avenue, Jersey City, N. J.



OFFICERS OF THE NEWARK BRANCH.
Reading from left to right are L. H. O'Donnell, J. Demar, C. A. Stiehle, J. Phelps, H. H. Smith, C. Frey, J. Hartnett, H. Baxter, F. Piskie, Edw. Faint, Mr. Baumer.

PERSONALS

ITEMS OF INTEREST TO THE INDIVIDUAL.

Ambrose Swasey, designer and builder of the Lick, Yerkes and United States Naval Observatory telescopes, has given $200,000 to promote engineering research. The Engineering Foundation has been inaugurated and the American Society of Civil Engineers will co-operate with the United Engineering Society, which is composed of electrical, mining and mechanical engineers, in the administration of the fund. Mr. Swasey is widely known as a member of the firm of Warner & Swasey of Cleveland, machine tool builders and manufacturers of telescopes, in which branch they are among the largest in the world. In addition to the famous telescopes of this country Mr. Swasey's firm is constructing the 72-inch reflecting telescopes for the Canadian Government. Mr. Swasey is 69 years old, a past president of the American Society of Mechanical Engineers and of the Cleveland Engineering Society.

Joseph L. Dinan, president of the Philadelphia branch of the American Electro-Platers' Society, has affiliated with the Celluloid Zapon Company, New York, and will represent them in New York City and vicinity. He was a charter member of the Philadelphia branch and its first recording secretary, which office he held until elected president in June, 1914. The Philadelphia branch wishes him success in his new venture.

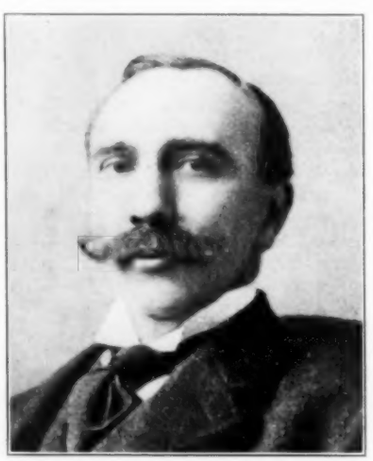
W. M. Corse, formerly works manager of the Lumen Bearing Company, has been appointed manager of the newly organized bronze department of the Titanium Alloy Manufacturing Company, Niagara Falls, N. Y. Hugh R. Corse will be sales representative, with headquarters in Detroit, Mich.

R. E. Ewing, for the past ten years designer at the Allegheny factory of the Pittsburgh Lamp Brass and Glass Company, Pittsburgh, Pa., has resigned to accept a similar position in the lamp factory of the Welsbach Company, of Gloucester, N. J.

DEATHS

LYDELL WHITEHEAD.

Lydell Whitehead, president of the Whitehead Brothers Company, dealers in molding sands and foundry equipment and supplies, Providence, R. I., died at his home in New York City, February 4, 1915, aged fifty-nine years. Mr. Whitehead had devoted his life-time for the selection and production of foundry sands and clays and for forty-two years was connected with the business acquired by Whitehead Brothers Company, and he has been its president since the present company was incorporated in 1892. He leaves a widow, a daughter and one son, William Whitehead, second, who is connected with the Whitehead company.



LYDELL WHITEHEAD

Thomas Ward, aged sixty-seven, president of the Pittsburgh Brass Manufacturing Company, Pittsburgh, Pa., died at his home on Wednesday, February 17. Mr. Ward is survived by a wife and two children.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS AND TRADE ITEMS OF INTEREST FROM THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

MARCH 8, 1915.

For the first time in months it is possible to report some symptoms of a return of business in the metal industries of the Naugatuck valley toward normal. The signs of better times are faint and uncertain, but they really exist and there will be a general improvement in normal business if they continue. They have been in evidence since the middle of February.

Ask almost any manufacturer how normal business is and the answer comes back promptly: "Rotten, thank you!" Ask how "war business" is and the reply is: "That's rushing!" That's the general situation.

War business is pushing some plants to their limit. Others are being worked night and day in some departments and only four days a week in others. Others are hardly affected. These are watch and clock factories, as a rule, although conditions may be said to be as good as could be expected. Retail clock dealers say that foreign clocks are being imported even now, and that their presence on the market is responsible for a marked check in the demand for domestic products. Watch business is slow. Thomaston's watch-making population is disappearing from that town, migrating to places where work is to be found. Waterbury has several of them in the Waterbury Clock Company's plant. Terryville's busy industry, the Eagle Lock Company is employing several, for that business is going along at a happy stride and with no signs of a slump. Bridgeport and New Haven ammunition and rifle plants have taken some.

There are many stories afloat about the plans of the Seth Thomas Clock Company as affecting the Thomaston watch industry there. It is certain that there will be a complete reorganization of the factory system and the institution of modern methods in every department before business is active again. The company is reported to have suffered much from petty pilfering, more or less systematically carried on, and the management intends to prevent such leaks hereafter. There is a large stock of watches on hand.

In Waterbury there is a great rush at the machine shops. The E. J. Manville Company reports its greatest business rush. It is drawing on the cities of Hartford, Providence, Boston and Bridgeport for skilled machinists, having exhausted the local supply. The same condition has been encountered by other corporations hereabouts.

Button orders from the British government are keeping the Waterbury Button Company busy. The Scovill Manufacturing Company and the Chase Rolling Mills Company and the Chase Tube mills are busy turning out tubing for shells and other metal products for war munitions, much of the business being done under personal inspection of British army officers. Much metal work has been done for the button makers for the Platt Brothers & Co., and Louis A. Platt, of that company, says that even the factories not kept busy on war goods are showing more activity, although short time rules yet. The Waterbury Farrel Foundry & Machine Company is running full time. There are day and night crews in some of the American Brass Company's local plants working on war goods and also on automobile manufacturing supplies. Rush orders for Curtis airships have forced the Hammondsport manufacturers to place orders in Waterbury, and similar conditions in Pittsburgh, Detroit and other cities have helped to keep several of the smaller factories here busy in spite of the dullness of normal orders.

There are few positive indications of prolonged activity like that of the present. There are still great numbers of men unemployed, though they are chiefly the unskilled laborers. The sudden termination of the war would probably be a very disturbing factor just now. On the other hand there is evidence of progress outside of war lines, such as a lively demand for Waterbury clocks in the English market, a revival of pleasure automobile business, steady machine orders, and a more cheerful tone among the manufacturers themselves. March will probably clear the atmosphere a little.—F. B. F.

NEW BRITAIN, CONN.

MARCH 8, 1915.

Conditions among the metal manufacturers in New Britain during the past month have shown a marked improvement in some branches. This is the season of the year when the various local concerns are holding their annual meetings, and some important matters have been taken up at these sessions. Of all local concerns of any prominence probably the New Britain Machine Company is at present the busiest. Several big orders received lately have compelled the employes to work on a seventy-two hour schedule, and it is said that should not another order be received for a year and a half this concern would be able to work its regular schedule without having to lay off any hands. The big order is for the monster automatic machine for making screws, which are made only by this concern.

Improved business is also noted at the Stanley Works, and during the latter part of February the operating time was increased from forty-five to fifty-four hours per week. At Russell & Erwin's, however, the opposite is true, and an eight hour schedule is now in effect.

By far the most important event in metal manufacturing lines in this city that has taken place in a long time occurred on February 23 when 12,000 shares of the capital stock of the North & Judd Manufacturing Company, held by President George M. Landers as trustee for Josephine Judd, were authorized distributed by the judge of probate. This stock is valued at $1,080,000. According to the terms of the will Grace Judd Landers and George M. Landers each receive 3,000 shares, equivalent to $270,000, and Gertrude Judd Bradley, Mortimer N. Judd and Harold Lee Judd each receive 2,000 shares, equal to $180,000. Mrs. Judd died in 1911, and it was her wish that the stock be held in trust until such times as George Landers thought it best to distribute it. It was the hope of Lorin F. Judd, her husband, that the shares of the North & Judd Manufacturing Company, which were in possession of the family, should remain in it. The distribution of last month carries out this desire.

The annual meeting of the stockholders of the American Hardware Corporation was held on March 2. The surplus was reported as $1,639,541.07, according to the thirteenth annual statement. The capital stock is $12,500,000, of which $2,580,00 is in the treasury. That changes may soon be made at the Stanley Works is evident from a new bill now pending before the Connecticut legislature, which, if passed, will give the corporation the right to remove the limit on its capital stock issue. At present the charter limits the capital stock to $3,000,000, of which $2,500,000 is already issued. The bill also provides to give the company the right to deal in stock to the extent of 2 per cent. of its own capital. Another big concern that seems to be preparing to increase its holdings is the Landers, Frary & Clark Company, which has recently purchased a plot of land 66 feet by 140 feet, adjacent to its present holdings. Up-to-date this concern owns 753 feet on East Main street, valuable frontings on other busy streets and one entire city block.

Annual meetings have been held at the following factories this month: Stanley Rule & Level Company; president, A. W. Stanley; vice-president, Robert N. Peck; secretary and treasurer, Charles B. Stanley. Beaton & Cadwell Manufacturing Company; president, A. J. Beaton; secretary and treasurer, William H. Cadwell. New Britain Machine Company; president, F. G. Platt; vice-president, M. C. Swift; secretary, R. S. Brown; treasurer, H. H. Pease; assistant-treasurer, A. Buol; assistant secretary, H. E. Erwin. Prentice Manufacturing Company; president, George E. Prentice; vice-presidents, Alphonse B. Porter and R. O. Clark; secretary, Benjamin Munch; treasurer, Alphonse B. Porter.—H. R. J.

BRIDGEPORT, CONN.

MARCH 8, 1915.

Thirty million dollars will be added to the annual business totals of Bridgeport's metal industries by the European war. This is shown by the figures recently obtained showing the enormous orders and almost fabulous profits various local concerns are receiving from the Allied nations.

The Union Metallic Cartridge Company, which has received an order for its entire output of ammunition for the next two years, is working day and night. Until the new building now being completed at Barnum avenue and Helen street is ready, the weekly output will be 3,500,000 rounds, but with the new facilities the working force can be tuned up to producing 7,000,000 rounds.

In addition to the new building for the manufacture of ammunition, the company has launched a new line, and has erected on Boston avenue, within a mile of the main plant, a huge building which is to produce bayonets for the Allies. Skilled labor will find a market for its ability here, although the company probes the pedigree of each applicant rigidly before allowing him to go to work. It is expected that this great addition will be started to work within a few days. The local Y. M. C. A. is receiving applications for metal workers who desire positions in the plant.

Bridgeport's metal factories, over 300 in number, including the smaller establishments, never knew busier times than now. Many of the brass and copper plants, including the huge plant of the Bridgeport Brass Company, have been equipped with ammunition making machinery and are turning out cartridges, complete or in parts, for the U. M. C. Company.

Today there is not a factory in Bridgeport closed and the majority of them are working overtime, some twenty-four hours a day, seven days a week. Practically every brass and copper working establishment in the city, as well as other metal working plants, are turning out sub-contracts for the U. M. C. Company. Even the sewing machine factories have profited by the war, because of the additional demand of manufacturers for more machines to turn out the war orders in made-up textiles and shoes.

The Bridgeport Brass Company, which never before manufactured ammunition, is making up 50,000,000 rounds of cartridges for rapid-fire machine guns. This is one of the subcontracts of the U. M. C. Company. The cartridges are unique in that they weigh 21 pounds to the thousand and are 90 per cent. copper. They are elongated at both ends and are referred to by the factory employes as "sanitary" cartridges, as no complications are said to arise from wounds inflicted by them. Other cartridges made for the Allies are the ordinary steel-jacketed bullets.

The Bullard Machine Tool Company, manufacturers of boring machines, and practically all others, are working to their capacity in turning out machinery to assist in the manufacture of war supplies.

The Monumental Bronze Company has gone into the manufacture of bronze castings for the Locomobile Company of America, which is busy filling the order for 500 motor trucks from the Allies, told of in the February letter. This order included provision for enough extra parts and engines to make 250 additional machines. The Automatic Machine Company of this city makes a gasoline engine to operate the intrenching machine now being manufactured for the Allies in Chicago. President Fred Enos of the Board of Trade stated today that there is not a factory in the city idle.—E. C. D.

PROVIDENCE, R. I.

MARCH 8, 1915.

The close of the month brings with it a greatly improved condition of the business situation, both actual and theoretical, than for more than six months past. This is especially the case with all the metal trades or branches, excepting perhaps the manufacturing jewelry industry and its allied lines. While few will admit the fact, nearly all of the machinery concerns, large or small, are feeling the direct influence of the war demands, while orders are daily being received that indicates steady time for months to come.

The metal trades establishments of the state, especially those in any way contingent upon war supplies, are exceptionally busy, and for the most part are running better than 85 per cent. of their capacity, mostly on foreign orders or on orders which will go to other plants that are busy on war munitions. There is still considerable demand for competent men capable of making varied lines of machine tools, shrapnel and other much-wanted metal products. The outlook continues bright, and more domestic business is finding its way into the factories of this state.

The Gorham Manufacturing Company's plant at Elmwood resumed operation the first Monday in the month after the usual two-weeks' shut down for overhauling and repairing of machinery, and taking of an inventory that is customary at this season. There are upwards of 1,500 employes in the plant, and it is probable that others will be added in a short time. In the bronze department business is rushing, and it is stated that the outlook is very encouraging. During the month of January the company made a better showing than during the corresponding month a year ago.

Business at the Brown & Sharpe Manufacturing Company is on the increase, the firm at present having fully twenty-five per cent. more hands employed than there were in April last. War orders continue to come in, and all departments are busily engaged. The company has just completed plans for an extensive addition to No. 5 building on Edith street. The building is 49 by 146 feet, two stories high, of brick, to which four more stories are to be added, making a six-story structure. A petition has been presented to congress on behalf of the Brown & Sharpe Manufacturing Company, asking for the adoption of the metric system in the United States.

President Samuel M. Nicholson, in his report to the stockholders of the Nicholson File Company at the recent annual meeting of that corporation, stated that the year 1914 had been a fairly satisfactory one, the corporation having a surplus of about $3,400,000 at the close of the fiscal year, and that the net profits of the corporation amounted to 17.23 per cent. on the capital stock. The following officers were re-elected: President and general manager, Samuel M. Nicholson; vice-president, Paul C. Nicholson; treasurer, George Nicholson; secretary and assistant general manager, Walter W. Griffith; assistant treasurer, Henry W. Harman; assistant secretaries, Harold C. Field and Augustus E. Saunders; assistant to president, Ernest S. Craig. The directors are: Samuel M. Nicholson, Marsden J. Perry, John Russell Gladding, George Nicholson, Paul C. Nicholson, Walter W. Griffith and Byron S. Watson.—W. H. M.

BOSTON, MASS.

MARCH 8, 1915.

Industrial conditions in the metal and other industries of this section are reflected most clearly, perhaps, in the current reports of labor organizations. Scarcely a day passes that does not witness some announcement of measures taken by bodies of organized workingmen to relieve unusual hardships of the un employed, the statement being made frequently in this connection that the stress of the times, despite this winter's exceptional mildness, is almost unprecedented in this section.

Some measure of relief comes from the response made to urgent appeals by city and state officials. Citizens are asked to make contracts for work because there are men needing employment, rather than because the work must needs be done immediately. Orders undoubtedly have been placed with manufacturers in many lines of trade, mainly in order that work may be given to mechanics, rather than because the persons placing the orders found it necessary to have the work done.

This has been beneficial in such lines as interior finish, and building operations have benefitted by this movement. Jewelers have not found new work abundant, but repair work, replating and similar activities get a little impetus from the disposition to be helpful in the placing of orders.

In the line of culinary apparatus for hotels and restaurants there is less new outfitting than usual at this season of the year, but this week one of the biggest concerns in the general copper manufacturing trade was advertising for experienced coppersmiths, and at the Fore river shipyards there was a call for men on metal shipwork.

Thus dullness in one quarter is partly offset by activity in another. It is believed in the trade that this month and next

will be months of expansion in several manufacturing lines, inasmuch as merchandise requirements for a while have been using up goods, it is calculated, somewhat in excess of production.

Furniture of brass, especially beds, has been rather quiet for two or three months, but of late has shown some signs of a spring revival. Outfits for soda fountains and bar fixtures, and appurtenances usually take on a new measure of activity at this period, but there is scarcely as much demand as usual this quarter for such products of the workshops. It would be safe to say that, aside from exceptional instances, the manufacturing ratio is now about 75 per cent. or less of normal.—J. S. B.

NEWARK, N. J.

MARCH 8, 1915.

E. J. Vatier, who was formerly head of the Newark Art Foundry, has taken the position of foreman for the Sterling Bronze Company, of New York City.

M. T. Goldsmith, late of the Goldsmith-Koch Company, is now manufacturing sterling and German silver lines at 532 Mulberry street.

The Elite Novelty Company doubled their floor space and their force of workmen and are working into the export business. They have opened a Chicago office at 312 West Madison street, in charge of H. B. McCardle. They are making German silver novelties and all kinds of plated work.

The Art Metal Works made enlargements to their factory. They have obtained the official contract for souvenirs for the Panama-Pacific Exposition and are also making new lines of cigar lighters, silver and gold.—H. S.

TRENTON, N. J.

MARCH 8, 1915.

There has been a decided slump in the metal industry during the past few weeks at nearly all of the local plants and the present prospects are not very encouraging. Salesmen on the road report that orders are few and those received here have been small ones.

Karl G. Roebling, secretary and treasurer of the Trenton Brass and Machine Company, has returned from an extended trip through several of the western States. He brought back few orders and reports the brass business dull. The plant is now turning out work for the John A. Roebling's Sons Company, of which Mr. Roebling is a director.

The Jordan L. Mott Company, of this city, is feeling the effects of the business depression. A short time ago the brass department was put on full running time, but now a slump has come and some of the employees of this department have been laid off. Superintendent Lindemer has favored the older employees with employment and has given preference to the married men. The polishers are working but four days a week. Business is particularly dull in the molding department and the molders are now working but three days a week.

The foundrymen in the employ of the R. D. Wood & Co. plant at Florence, N. J., have been notified by Superintendent D. E. Maxfield that they can no longer have liquor in the homes owned by the company. The corporation owns three hundred houses. According to a notice posted in the plant all employees who disregard the rule will be dismissed. The Billingham Brass and Machine Foundry also reports business very poor, but Philip Billingham, president of the company, says he believes that the trade will become better in a few months when building operations begin in earnest.

The Skillman Hardware Manufacturing Company is experiencing a very busy season at the present time, despite the depression in business at many other plants. William G. Wherry, general manager, says that he has enough orders on hand to last some time. "We do not know where all the work is coming from," he said to a representative of The Metal Industry, "but orders seem to be coming in from all parts of the country. We fail to understand so much prosperity in our line, but are glad to have plenty of work." The Skillman company is one of the largest plants of its kind in the East and turns out various kinds of brass and copper hardware supplies.

The plant of the Ingersoll-Trenton Watch Company is busy at the present time and Manager George F. Eberhard says the plant is turning out a large order for foreign nations, and that the sudden wave of prosperity will greatly benefit the company's Waterbury plant.—C. A. L.

LOUISVILLE, KY.

MARCH 8, 1915.

Business with coppersmiths and allied trades of Louisville is exceedingly quiet at this time. The bottom appears to have dropped out from business for the present, and a number of the shops are finding things far more quiet than at any previous time inside of two or three years. Large manufacturing concerns which generally have a good many castings made for use in various kinds of machinery are only working about half-time and in many cases are carrying fair supplies of the various castings needed. The copper works are expecting to see an improvement in conditions during March, but are not at all certain that conditions will improve greatly.

Lewis Stege, of the E. A. Stege Manufacturing Company, said that the shops were only working about eight hours a day just now. The regular schedule during normal seasons is about ten hours. A good deal of automobile plating work is expected during March and April. Radiators and other bright metal parts become dulled during the winter and are done over when the cars are painted in the spring. A number of owners of Ford automobiles have taken up a fad of nickel-plating the radiators, and last season the company handled a good deal of this work.

Charles Schadt, of the Independent Brass Works, said that February was the quietest month the concern has experienced since it first entered the business. No sleet was experienced this year and the Louisville Railway Company purchased a far smaller quantity of ice cutters and special trolley wheels than usual. Other concerns which have a good deal of special casting done are only working about two or three days a week.

Matt Corcoran, Jr., of Matt Corcoran & Co., reported business as very dull and said that his shops were not working anything like to capacity. An improvement is expected during the latter part of March.

The Universal Swing Joint Company, of Louisville, is making preparations to increase its business considerably and manufacture on a larger scale. A lot of new machinery and equipment has been purchased and installed. The concern manufactures a valve joint that works equally well under pressure or suction and is for water or steam.

Ed. and Price Daugherty, of Winchester, Ky., have opened a shop in Winchester to handle nickel plating, polishing, etc. Electric equipment was installed to handle the work. The boys have only been in business a short time, but are doing nicely. —G. D. C.

Owing to increase in business the Newman Manufacturing Company, of 717 Sycamore street, Cincinnati, have taken another floor, manufacturing a complete line of brass poster frames, rails, easils, brass hardware, etc. They have an office at 101 Fourth avenue, New York City, and at 108 West Lake street, Chicago.

The Dix Manufacturing Company, of 1201 Guilford avenue, Baltimore, Md., are building a new factory at Concord and Eager street, of reinforced concrete and fireproof. They will install machinery to manufacture hardware specialties.

James Morrison, Jr., owner of the Montross Metal Casket Company, of 5 East Forty-Second street, New York City, has reorganized and changed the name of the concern to the Hagerstown Stamping & Enameling Company and moved the concern to Hagerstown, Md. The company makes automobile stampings and metal caskets.—H. S.

BUFFALO, N. Y.

MARCH 8, 1915.

It seems the bottom has dropped completely out of the local dealers' bucket of hope, optimism and enthusiasm which prevailed the fore port of the last month. While they are not necessarily pessimistic, yet they feel the chill on their enthusiasm and optimism. Some of the local dealers took advantage of the recent drop in copper by buying large quantities. But the rising of tin has met with a great deal of displeasure.

Locally the metal men are a bit nervous about the present

attempt to block our ships. This is because, should the warring nations bring our shipping to Europe to a standstill, it would cause the price of copper and other metals to drop way below normal, as much of the copper used is for foreign trade. With their heavy stock of copper bought at a higher price, and trade at a standstill, this would mean a heavy loss.

A few of the dealers, despite the depression, are doing a fair amount of business, while the majority are just moving along with nothing to cause them to get excited about.

Out of the two or more scores of local foundries, only four of them can say that they are continually busy. In talking with THE METAL INDUSTRY representative, Mr. William Marr, manager of the National Bronze Company, said: "We are quite busy at present; in fact we have booked more orders during the past week than we have during the past six months."

Mr. R. C. Adams, local manager for the Aluminum Castings Company, said: "At present we are very busy making castings for auto and truck manufacturers." How do you find trade conditions generally the writer then asked him, to which he replied: "We find that inquiries and orders are coming in gradually. But when they do come they want them quick, which goes to show that the consumers' shelves are bare, therefore they request all orders to be filled with a rush." He continued by saying: "I believe we will soon have a break in this business deadlock. It will not be sudden, but rather gradual. A gradual growing of confidence and trade."

The Unique Bronze Company landed another order to do all the yellow brass work for 300 Pierce trucks, while the Lumen Bearing Company got the manganese bronze work. Within the past few months these two firms have done the yellow brass and manganese bronze work for 1,700 motor trucks and 700 pleasure cars.

A change has been made in the executive staff of the American Bronze Company. The directors recently elected the following new officers: President, C. A. Bierma, Buffalo; vice-president, Charles Griffiths, Westfield, N. J.; secretary and treasurer, Charles E. Knorr, of Buffalo.

Harry Harriton, a local wholesale metal dealer, has bought a large interest in the Schnell Bronze Bearing Company, Inc.

The Buffalo Brass Foundry are contemplating the moving of their plant from Springer street to a more centrally located district.

Finished and rolled metals are moving slow. The majority of the orders which are keeping these firm busy are nearly all foreign orders. The Zero Valve & Brass Manufacturing Company during the past week landed a $8,000 blanket order, to be delivered monthly. A certain number of nozzles, etc., each month for tea kettles. Other than this nothing large was stirring in this field of operation.

Electroplaters are straining every effort to keep their heads above water. While none of them have been obliged to shut down, they all manage to keep from so doing by keeping a few men busy.

Walter Hayes, of the United States Cast Iron Pipe & Foundry Company has added to his many interests a partnership with Christ Haeberli, of the Washington Plating Works, 76-80 Washington street. In addition to their electroplating work, they intend to manufacture what will be known as the "Washington Combination Pliers," invented by Christ Haeberli. It's seven tools in one. It's a combination of a hammer, tack puller, screw driver, pinchers, wire cutters, pipe pliers and shears or snips. They expect to market their article within the next two weeks.

Mr. C. E. Martzloff, secretary of the S. A. Day Manufacturing Company, of 23 Demond Place, said: "We are running full capacity in our plant at the present time, but how long it will last I cannot say. We are spreading our field of trade both east and west. Inquiries are coming in for supplies from heretofore unknown sources. Every day we are adding new customers in our books."

A few years ago the country clubs and gun clubs of this district paid little or no attention to empty cartridges either from rifle or shot-gun shooting. During the past few months the clubs have taken notice of the amount of brass which was going to waste, and all empty cartridges and shells are now barreled and sent to the metal refineries or junk dealers.

Mr. W. Sheldon, local sales manager for the Buffalo Copper & Brass Rolling Mill, has been promoted to the position of eastern representative, with headquarters in the Postal Telegraph building, New York City. The Buffalo copper people have just opened this office, and Mr. Sheldon took charge the first of March.—G. W. G.

CINCINNATI, OHIO

MARCH 8, 1915.

Where there are still several lines of business in this section, whose demands are usually met by the metal industry, which have something to ask in the way of increased activity, the greater number of the concerns in Cincinnati's principal manufacturing line, machinery, are doing about all that could be expected, under the circumstances. The extent to which exports are moving is indicated by the recently published figures, showing that the January trade balance in favor of the United States breaks all records, being about $147,000,000; and of the huge amount which resulted in this excess of exports over imports, the local machinery trade undoubtedly contributed its fair share, if not more. It is undoubtedly very fortunate that this is the case, in view of the fact that domestic business remains rather slow in most quarters. Manufacturers in most lines of business are disinclined to make improvements, which means that the home demand for metal goods is slow, as a rule. There are not lacking signs, however, that this conservative feeling is giving way to optimism, as the spring season gets under way, and that before long the high prices being received for foodstuffs and for the other American products going abroad will make themselves felt in better business all around.

"There is plenty of business in sight for all of us," declared a local foundryman not long ago, "if only all branches of trade would buy what they need, instead of holding off and making things do as they are. What with the demand from the machine-tool and other manufacturers locally, which is keeping us running now, things would be booming if home business were only up to the mark. As soon as people get over their scare and settle down to business again, watch things pick up."

Robert Hesterberg, a retired brass founder of this city, was recently formally adjudicated incapable of looking after his affairs, and he was placed under the guardianship of his wife, Mrs. Amelia K. Hesterberg.

In the bankruptcy proceedings brought by the Ohio Brass & Copper Company and other creditors against the Davis Dairy Machinery Company, an order has been made by the United States District Court postponing the adjudication of bankruptcy for thirty days, in order to permit the company's receiver in the State courts to close up some business now pending, of advantage to the bankrupt. The Regle Brass Company, of Marysville, Ohio, has filed amended articles of incorporation increasing its capital stock from $75,000 to $110,000.—K. C. C.

COLUMBUS, OHIO

MARCH 8, 1915.

The metal market in Columbus and central Ohio shows a little improvement over the condition a month ago. Buying is a little better and prices generally are firmer at levels slightly in advance of those of a month ago. The feeling generally is better and the future appears brighter. Just what the future will be is a difficult thing to predict, as the European war is one of the controlling factors.

Buying is still from hand to mouth, as it were. Users of metals are loath to accumulate stocks at this time and are only contracting for the immediate future. One of the best features is the better feeling in zinc scraps, which are selling at higher quotations. Conditions are still far from normal, although dealers are inclined to view the situation more optimistically.

D. C. Barrick, secretary of the Union Metal Manufacturing Company, of Canton, Ohio, announces that the company is having plans prepared for the erection of a large addition to the plant during the spring. The new structure will contain 20,000 square feet of floor space.

The Republic Stamping and Enameling Company has taken over the plant, real estate and business of the General Stamping Company, of Canton, Ohio, and has increased its authorized capital from $1,200,000 to $3,500,000. The deal will put the concern in position to produce the raw materials and also the finished products.—J. W. L.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Nutter and Barnes Company, Hinsdale, N. H., have received a large order for their metal cutting-off machinery.

The Chase Rolling Mills, of Waterbury, Conn., has bought up the machinery of the brass shop of Gustave Cornelis, Woodtick, Conn.

The Hampton Roads Silver Company, Norfolk, Va., has been incorporated with a capital stock of $100,000. The incorporators are E. C. Hathaway, president, J. N. Luke, secretary and others.

The Aluminum Sign Company, Kewanee, Wis., expect to build an addition to its plant in the spring and which will be used as an office, storeroom, shipping department and lacquering department.

The Maryland Brass & Metal Company, Baltimore, Md., has filed application for the permission to commence the erection of a two-story brick warehouse and factory on the west side of Guilford avenue, near Federal street.

The Pilling Brass Company, Waterbury, Conn., announce that the published report that plans are being prepared for the erection of a brick, 50 x 70 foot, one story and basement addition to its plant is a little premature.

The Rome Wire Works, Rome, N. Y., has awarded the contract for the construction of the addition of a small room to its plant to be used for tinning wire. The company announces that they will build all the machinery needed in this new department.

Frank Brothers purchased at the receiver's sale the plant and business of the Detroit Bathtub & Brass Manufacturing Company, 97 Baltimore street, Detroit, Mich. It is also stated that a syndicate will soon take over the business and operate it on a larger scale.

The Baird Machine Company, Bridgeport, Conn., manufacturers of presses, wire and metal forming machines, tumbling barrels and other types of machinery has awarded the contract for a new storehouse 42 x 102 feet, and of steel and sheet iron construction.

The Electrical Alloy Company, manufacturers of German silver, phosphor bronze, aluminum and other materials, Morristown, N. J., has opened offices at 30 Church street, New York, The Bourse, Philadelphia, Pa., and at the Equitable Building, Baltimore, Md., all of which will be in charge of E. O. Oeters, who has been appointed their eastern representative.

The District Court of the United States for the district of New Jersey announces that Jacob L. Newman, trustee, recommends that the plant occupied in Newark, N. J., by the Renziehausen Company, bankrupt, be sold to A. Otto Birn for $12,000. A meeting is being held to consider this recommendation at the time of our going to press.

Lack of orders as a result of the European war has resulted in the closing of the plant of the Philadelphia Watch Case Company, which is located at Riverside, N. J. This condition of affairs causes 1,000 men to lose their positions and also the continued idleness of several thousand more who had been previously laid off on account of lack of work.

The Sandoval Brass Works, Sandoval, Ill., have engaged in the manufacture of brass castings, brass ingots, solder and the refining of zinc. W. G. Keller, formerly with the Illinois Smelting and Refining Company, and George Tadich, formerly with the Mineral Spring Zinc Company, are connected with the new concern and have had a wide experience in this line of business.

The Warner & Swasey Company, manufacturers of turret lathes, screw machines and brass-working machine tools, Cleveland, Ohio, report that they have applied for a certificate of increase in capital stock from $1,000,000 to $2,000,000, but that at the present time no action has been taken to actually increase it. It is stated that the actual increase in the capital stock to be made this time will be only $250,000.

James H. Rhodes & Co., of New York and Chicago, announces that they are now manufacturing "Carlsruhe" cleanser in this country, and that they are doing it so efficiently that one pound of the American made material will do as much work as 1½ pounds of the material which they formerly imported. Their expert on plating solutions, H. G. Stevens, will devote his time to demonstrating "Carlsruhe" cleanser, and to helping manufacturers out of any difficulties encountered in their plating departments.

The Northern Blower Company of Cleveland, Ohio, have just completed the largest dust collecting system that has ever been installed on tumbling mills in this country. This installation was at the plant of the Best Foundry Company at Bedford, Ohio. The Northern people report that they have been extremely busy for the last eight months. This company manufacturers an up-to-date blower system for polishing and buffing lathes, and can carefully construct all provisions for the safety of operators who use the machines.

Some idea of the proportion of manufactured brass that goes into cartridges may be gathered from the statements published in the daily press that 3,500,000 cartridges a week have been going to Great Britain for about six months. These figures were made up from contracts that were made public in a law suit now in progress between a firm of exporters and cartridge manufacturers. The papers in the case declare that the Remington Arms-Union Metallic Cartridge Company have an output of 1,500,000 per week while the Winchester Repeating Arms Company's output totals 2,000,000 per week.

The Dirigo Manufacturing Company, of New York, N. Y., reports through W. A. Ventic, general manager, that in addition to a casting shop and rolling mill which the company expects to acquire, it will also be necessary for them to have a factory for the manufacture of various lines of hollowware, flatware and jewelry novelties. While the location for these two factories has practically been decided upon, the matter of some equipment is still open. The Dirigo Company are manufacturing articles of jewelry novelties, etc., from Cupror and other mixtures of aluminum bronze.

A wonderful record for prompt shipment was recently made by the Whiting Foundry Equipment Company, Harvey, Ill., on an order for a three-motor electric traveling crane, 10 tons capacity, 30-foot span. Telegraphic order was received at their plant January 23, calling for delivery of crane complete on purchaser's runway at New Bridge, Del., February 10, 1915. Drawings were made, crane constructed, and shipment made January 29, 1915. Crane reached New Bridge February 4 and was erected complete ready for service February 6, or four days ahead of schedule time.

The Hampton Roads Silver Company has been organized to take over the Roginia, Norfolk, Va., plant of the Wm. A. Rogers Company, Ltd., of Niagara Falls, N. Y. The president is E. C. Hathaway; vice-president, and general manager, J. M. Williams; secretary, Charles R. Barnes, and treasurer, A. F. Cathey. Electric power will be furnished by the Virginia Railway & Power Company at such low rates that the plant can be operated very much more economically than at Niagara Falls. It is expected to increase the capacity to a thousand dozen flatware per day, and machinery is now on the ground sufficient to turn out that capacity when business justifies it.

A company has been formed to engage in the manufacture of metallic magnesium under the name of Aviation Materials Corporation and has been incorporated under the laws of New York state. The corporation will operate under the patents of George O. Seward and F. Von Kügelgen, the process having been developed by them at the Virginia plant of the Virginia Electrolytic Company. The president and general manager of the Aviation Materials Company is Mr. George O. Seward of 99 Cedar street, New York City. Work has been started on a plant to turn out ten tons of metallic magnesium monthly, and the corporation expects to have the metal for sale inside of three months.

A new aluminum plant has been started at Wellsville, N. Y., and will operate under the name of the Victor Aluminum Manufacturing Company, and will engage in the manufacture of all sorts of aluminum articles. Those interested in the new company are J. Lester Rockwell, Fay Rockwell and Wm. Earle Browning, formerly sales manager of the National Aluminum Company of Elmira, N. Y. The Victor Company has leased a factory and has purchased the presses and machinery of the Buck Silver Company, Salamanca, N. Y., former manufacturers of silver plated ware. A plating and polishing department and casting shop will be among the different departments operated by this concern.

The Goldschmidt Thermit Company, New York, N. Y., realizing that there is quite a field for a manganese-aluminum alloy announce that they have produced an alloy of 25 per cent. manganese and 75 per cent. aluminum, made from 98 per cent. carbon free pure manganese metal and new ingot aluminum. The alloy is therefore free from iron and carbon and it is expected that this form of alloy will allow of the introduction of manganese in aluminum castings and others, where it is desired to add manganese, and thus close the grain and reduce shrinkage. One interesting point in connection with this alloy is the fact that probably all previous experiments with the use of manganese and aluminum have been made with the usual 80 per cent. manganese (containing about 15 per cent. iron and 5 per cent. carbon), which has not proved suitable and consequently it is expected that more beneficial results will be obtained by using this particular alloy.

Under date of February 25 the American Chain Company of Bridgeport, Conn., reported that they had purchased the plant of the Bridgeport Electroplate Company on Kossuth street, and in about ten days would have the equipment moved to their new building on Connecticut avenue and Logan street. A large part of the Bridgeport Electroplate Company's business has, for some years past, been the brass plating of cross chains and the cold galvanizing of side chains for weed chain tire grips which the American Chain Company manufacture for the Weed Chain Tire Grip Company. It was, therefore, only logical that, as part of general plans for concentrating equipment, they should take over the equipment of the Bridgeport Electroplate Company. The jobbing business of the Bridgeport Electroplate Company, together with that of the Bridgeport Metal Treating Company, which the American Company has also purchased, will be continued and the two equipments will be re-organized as the metal treating department of the company, with J. C. Thompson, who has in the past, been identified with both concerns as department manager.

LECTURE COURSE IN TRADE JOURNALISM.

The first Forum in Industrial Journalism has been established at the New York University under the auspices of the New York Trade Press Association. During this academic year a series of eight lectures is to be given in February, March, April and May by men prominent in the class, technical and trade journal field. These lectures will be for students and any others interested—men and women. Cards of admission may be had by addressing the secretary of the New York Trade Press Association, S. T. Henry, at 231 West Thirty-ninth street, New York.

The idea of the Forum is to provide a nucleus for a university course where young men and women who plan to take up trade journalism may be trained for the profession. The first lecture of the course was delivered on the evening of Wednesday, February 10, by Charles T. Root, president Root Newspaper Association and publisher of the Dry Goods Economist, New York. Mr. Root's subject was "The History and Development of Industrial Journalism." Other lectures are scheduled by E. A. Simmons, Railway Age Gazette; James H. McGraw, McGraw Publishing Company; H. M. Swetland, United Publishers' Corporation; John A. Hill, Hill Publishing Company; W. H. Taylor, David Williams Company, publisher of The Iron Age; W. H. Ukers, Tea and Coffee Trade Journal, and John Clyde Oswald, American Printer.

CHANGE IN FIRM NAME

At the annual meeting, February 18, the stockholders of the Metallurgic Engineering Company, Chicago, adopted a recommendation of the directors that the name of the company be changed to the Snyder Electric Furnace Company. Proper steps have been taken to put the change of name into effect. No change has occurred in the personnel of the company. The officers are: Frederick T. Snyder, president; Carl H. Booth, vice-president; W. K. Booth, secretary; F. E. Berggren, treasurer. The main office will continue to be located at 53 West Jackson boulevard, Chicago, Ill.

FIRES

The plant of the Indiana Brass Works, Frankfort, Ind., was destroyed by fire on February 1. The company announces that they will start up again at once.

Fire recently destroyed the five-story building of the Western Lampard Brass Works, Chicago, Ill., and the estimated loss is about $100,000. The company announces that at the present time they are unable to give any information relating to the future of its business.

Fire, which on January 22, destroyed part of the factory of the G. B. Essex Brass Company, manufacturers of lubricating devices, Detroit, Mich., did about $20,000 damage. The company is now operating its foundry and part of its brass machine shop. Work is under way for the erection of a new and thoroughly up-to-date factory, with every modern convenience.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

To engage in sheet metal work, etc.—The Union Sheet Metal & Plumbing Company, Bartlesville, Okla. Capital stock, $5,000. Incorporators: C. J. Cottrell, president; Orin Weaver, vice-president, and T. L. Eusch, secretary and treasurer.

To manufacture brass and bronze castings and bearings.—The Mangus Company, Atlanta, Ga. Capital, $100,000. Incorporators: F. E. Beal, H. N. Randolph, R. S. Parker and others.

To do a general metal-ware manufacturing business.—The Schlueter Manufacturing Company, St. Louis, Mo. Capital, $175,000. Incorporators: Julius A., Walter H., Albert J., and Herbert C. Schlueter. This company has been established since 1902 under the partnership and the incorporation will make no change whatsoever. The following are a list of the departments operated by this company: Spinning, stamping, galvanizing, tinning and japanning.

FOREIGN TRADE OPPORTUNITIES

For addresses of these enquiries apply to Bureau of Foreign and Domestic Commerce, Washington, D. C., and give file number.

Sulphur and Sulphate of Copper, No. 15,737.—An American consular officer in southern Europe reports that a firm in his district wishes to purchase sulphur and sulphate of copper.

Metal Varnishes, No. 15,722.—A firm in France which deals in photographic apparatus has informed an American consular officer that it wishes to represent American manufacturers of metal varnishes. Reference is given.

Brass Wire and Rods, No. 15,622.—An American consular officer in Great Britain reports that a firm in his district has made inquiry for the names and addresses of American manufacturers of high-speed brass rods for turning, and brass wire.

Copper Wire, Tubes, Bars and Sheet Copper, No. 15,429.—A business man in Spain informs an American consul that he wishes to communicate with American manufacturers of copper wire, tubes, bars and sheet copper. Prices and catalogues should be sent immediately. Correspondence should be in Spanish.

Sheet Nickel, No. 15,613.—An American consular officer in Italy reports, by wire, that a government contractor has requested cable bids for 300 tons of pure nickel in sheets of 2 millimeters thickness. Price, c. i. f. destination, date of delivery, and conditions in regard to payment should be stated in bids.

Antimony, Regulus, Oxide and Sulphite, No. 15,781.—The Bureau of Foreign and Domestic Commerce is in receipt of a letter from a firm in the Far East stating that it wishes to be placed in communication with American buyers of antimony, regulus, oxide and sulphite. References are offered.

Copper, Latten and Aluminum Wire, and Plates, Etc., No. 15,591.—The Bureau of Foreign and Domestic Commerce is in receipt of a letter from a business man in Spain stating that he wishes to represent American manufacturers of, or dealers in, copper, latten and aluminum wire, and plates, etc. He suggests the following or better terms: One-fourth cash on placing the order, and three-fourths cash on arrival of the bill of lading. American mercantile reference is given.

Copper, No. 15,773.—An American consular officer in one of the neutral European countries reports that there is needed 5,000 tons of copper for local consumption. It is stated that the industries will have to suspend operation if the copper cannot be obtained. The Department of State has cabled for the names and addresses of interested firms. When these have been received they may be had on application to the Bureau of Foreign and Domestic Commerce and its branch offices.

Copper Sulphate, No. 15,785.—An American consular officer in the near East reports that a firm in his district desires to get into touch with manufacturers of sulphate of copper (blue vitriol) with a view to making importations at once. The firm wishes to receive cable quotations, c. i. f. port of entry, including war-risk insurance. It is explained that 20 per cent. will be advanced with orders, and the balance will be paid cash against documents presented through a bank in the foreign country, or the transaction will be covered by a confirmed letter of credit.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

PRINTED MATTER

Titanium Aluminum Bronze.—The Titanium Aluminum Alloy Manufacturing Company, Niagara Falls, N. Y., have issued a new booklet giving full descriptions of their new titanium aluminum bronze. Send for a copy.

Scientific Papers.—The Bureau of Standards, Department of Commerce, Washington, D. C., have issued circular No. 52, Regulation of Electrotyping Solutions, and bulletin No. 242, The Emissivity of Metals and Oxides. Copies of these bulletins may be obtained upon request.

Solders.—The North American Selling Company, 180 Broadway, New York, N. Y., describe in a folder just issued the different properties of three varieties of solders which they are now manufacturing. No. 1 is used for aluminum and silver aluminum alloys, No. 2 for jewelry and No. 3 for brass and copper.

Malleable Furnace.—The Harbison Walker Refactories Company, Pittsburgh, Pa., have issued a very handsome little book on "The Study of the Malleable Furnace." This book consists of 114 pages, is gilt edged and bound in leather and contains a wealth of material relating to the malleable iron furnace and its product.

Foundry Equipment.—Frederic B. Stevens, manufacturer of foundry equipment, etc., Detroit, Mich., has issued a very attractive catalog of forty-six pages giving illustrations and descriptions of the complete line of foundry materials manufactured and handled by him. The catalog is most complete and is filled with interesting foundry information from cover to cover. Copies of this catalog will be sent upon request.

Aluminum.—Aluminum Facts and Figures is the title of a very interesting little book just issued by the British Aluminum Company, of London, England, Arthur Seligman, 165 Broadway, New York, N. Y., American agent. The book consists of fifty-six pages, printed on parchment paper with a clear distinct type that makes the perusal of the many tables giving data relating to aluminum sheet and wire a pleasure.

Bronze Castings.—The Falcon Bronze Company, Youngstown, Ohio, has issued a catalog giving description of the bronze and brass castings that they make for every kind of machinery. These include rolling mill brasses, vats, rods, bolts and braces, electric car and motor bearings, railroad brasses and engineering bearings. One of the notable achievements that this company has made is the development of a method of melting brass or bronze in an ordinary iron cupola and a casual glance through the catalog will back up the statement that they can produce the goods.

Shears.—The Canton Foundry & Machine Company, Canton, Ohio, describe in a twenty-page catalog the various forms of shears which they manufacture in addition to the stop motion shears shown in the February issue of THE METAL INDUSTRY. Among the machines that are illustrated and described are the high and low knife types, stationary or portable styles, either independent or motor driven. They also show their No. 6 low knife Canton, which weighs 38,000 pounds and cuts 3½ inches square soft metal, and also No. 7, which weighs 60,000 pounds and cuts 4 x 4 inches solid metal.

Centrifugal Pumps is the title of a 64-page bulletin just issued by The Terry Steam Turbine Company, giving details and data on various turbo-pump applications. The principals of operation and construction of the centrifugal pump are clearly explained, as are the details of the steam turbines which have been successfully used during the past ten years for driving them. This booklet should certainly be in the hands of those who are interested in any kind of a pumping problem. Write to The Terry Steam Turbine Company, Windsor street, at Windsor avenue, Hartford, Conn., for a copy.

Brass Foundry Equipment.—The Whiting Foundry Equipment Company, Harvey, Ill., has just published catalog No. 114, superseding No. 108 and catalog No. 113, superseding No. 92. The first mentioned of these catalogs contains detailed description of the brass foundry equipment manufactured by this company. These include brass furnaces of all

sizes, crucible tongs and small tumblers for brass work, while the latter one is devoted to extensive lines of tumblers and cinder mills which this company are installing in both large and small foundries. Copies of either or both of these catalogues may be obtained upon request.

Carlsruhe Cleanser.—James H. Rhodes & Company, 85 Front street, New York, and 162 W. Kinzie street, Chicago, have issued a new booklet on "The Modern Method of Cleansing Metal Surfaces." This is attractively gotten up and gives very complete instructions for cleaning metals with Carlsuhe cleanser. The fact is brought out that with the exception of Carlsruhe, all other cleansers on the market are some form of caustic alkali, while Carlsruhe cleanser is not, and does the work in an entirely different manner. It removes the grease without changing the grease into a soap. The manufacturers claim that the use of Carlsruhe has three important advantages; no scrubbing is required on 75 per cent. of the work, and on the balance only a single wipe is necessary. The cost of scratch brushes and labor of using them is done away with. The metallic surface is made chemically clean, which no caustic alkali can do. Also the solution is absolutely harmless and will not injure the workmen's hands. Copies of this booklet will be sent by the manufacturers on request.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL MARKET REVIEW

NEW YORK, March 8, 1915.

COPPER.

The copper market has been very cleverly worked up during the month of February from around 13½ cents for electrolytic to 14¾ cents 30 days delivered at the end of the month. The Amalgamated proper have put their price up to 15 cents on the strength of a large block of copper that they have sold or hope to sell to Europe. The demand here has not been brisk at any time. The exports for the month were 33 million pounds—this is less than half what they are in normal times. The home consumption is estimated at around 40 to 50 million pounds and the production at 90 million pounds. On this guesswork basis the stocks of copper for the month would show an increase of possibly 15 million pounds. To talk about a shortage of copper and a "sold up" condition, as some of the producers actually do, seems really funny, but, of course, we have to take it all seriously and pretend we believe it. To put the market up a quarter cent a pound because one hopes to sell a big block abroad may be good business for the producers and may also help to scare some of the home buyers into the market. The brass mills are certainly working night and day on export orders, but the electrical works and the wire drawers are not doing any better than 45 to 50 per cent. of capacity and the consumption of copper cannot be far away from the guess estimates.

Producers prices today are 14¾ delivered for electrolytic and the Lake companies ask the same price. Casting copper is around 14 cents New York.

TIN.

The stocks of tin here are more than ample, consumption during the month of February was only 3,375 tons, but the price here has lately been rushed up to over 42 cents on a scare that shipments will not come along freely from London and that there will not be enough tin to fill March contracts.

Shipping from London is very much congested, and London sellers could not name definite dates, so that delays are likely. It is more than likely, however, that matters will straighten out all right. The price of tin today is nominal from 50 to 52 cents, but the tension is still acute and the condition is being exploited for every cent there is in it.

LEAD.

The Trust put the price up on February 16 one dollar a ton, and again on March 1 another dollar, to $3.90. New York basis the price ruling today. The market is very quiet, and there is no rush to buy lead at this fairly cheap figure.

SPELTER.

The spelter market has been very excited and is still on the jump. From 7¾ cents a month ago to 11 cents today for spelter is going some. No prices are named and each sale of a carload means an advance. The New York market today is around 11 cents. Sheet zinc has been advanced to 13 cents at the smelter.

ALUMINUM.

Market dull and quiet, with prices about the same as a month ago. On ingots 98-99 price the market is quotable at 19 cents to 19¼ cents.

ANTIMONY.

The market continues very firm, with further inquiries from Europe. Cookson's is quotable today at 23 cents, Hallett's 21¼ cents, Hungarian grade 18 to 19 cents.

SILVER.

The price of silver has not varied much during the month. Opening at 48⅝ the highest point was 48⅞ cents and the lowest 48. The official price on March 1 was 49¼ cents and 23¼d. in London.

PLATINUM.

The market dull and more or less weak with prices $3 per ounce lower. Ordinary refined is quoted at $41, with 10 per cent. hard at $42.

QUICKSILVER.

The wholesale price was advanced from $58 per flask to $62, the highest, and on March 2 the price was reduced to $60.

SHEET METALS.

The price of sheet copper has been advanced to 19¾ cents base, wire is quotable at 15¾ cents, and high sheet brass at 17 cents.

OLD METALS.

The scrap copper market has held very steady, owing to the advance in ingots, and some good business has been done. Zinc scrap has boomed with the advances in spelter. The other metals have not been much affected and prices are about the same.—J. J. A.

FEBRUARY MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER:			
Lake	15.25	14.50	15.00
Electrolytic	14.75	14.55	14.65
Casting	14.50	14.00	14.25
TIN	39.55	35.95	37.40
LEAD	3.90	3.80	3.85
SPELTER	10.25	7.80	8.90
ANTIMONY (Hallett's)	21.35	17.50	19.35
SILVER	48⅞	48.00	48.48

WATERBURY AVERAGE

The average prices of Lake Copper and Brass Mill Spelter per pound as determined monthly at Waterbury, Conn.:

1913—Average for year, 15.83. 1914—Average for year, 13.91. 1915—January, 14⅛. February, 15.25.

Brass Mill Spelter. 1915—January, 6.55; February, 11.85.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

Metal Prices, March 8, 1915

NEW METALS.	Price per lb. Cents.
COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER.	
Manufactured 5 per centum.	
Lake, carload lots, nominal	14.75
Electrolytic, carload lots	14.60
Castings, carload lots	14.00
TIN—Duty Free.	
Straits of Malacca, carload lots	.50 to 52
LEAD—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots	3.90
SPELTER—Duty 15%. Sheets, 15%.	
Western, carload lots	11.00
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	24.00
100 lb. lots, f. o. b. factory	21.00
Ton lots, f. o. b. factory	19.00
ANTIMONY—Duty free.	
Cookson's cask lots, nominal	23.00
Hallett's cask lots	21.25
Hungarian grade	19.00
NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad. valorem.	
Shot, Plaquettes, Ingots. Blocks according to quantity	.38 to .43
ELECTROLYTIC—3 cents per pound extra.	
MANGANESE METAL	nominal
MAGNESIUM METAL—Duty 25% ad valorem (100 lb. lots)	nominal
BISMUTH—Duty free	2.25
CADMIUM—Duty free	1.85
CHROMIUM METAL—Duty free	.75
COBALT—97% pure	2.00
QUICKSILVER—Duty 10%, per flask	$60.00 to $62.00
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	38.00
SILVER—Government assay bars—Duty free	49½c.

INGOT METALS.	Price per lb. Cents.
Silicon Copper, 10% ... according to quantity	25 to 28
Silicon Copper, 20% ... " "	28 to 32
Silicon Copper, 30% guaranteed " "	30 to 34
Phosphor Copper, guaranteed 15% "	23 to 27
Phosphor Copper, guaranteed 10% "	19 to 23
Manganese Copper, 30% ... " "	22 to 26
Phosphor Tin, guaranteed 5%. " "	57 to 60
Phosphor Tin, no guarantee ... " "	42 to 45
Brass Ingot, Yellow ... " "	11 to 12
Brass Ingot, Red ... " "	12 to 12½
Bronze Ingot ... " "	13½ to 14½
Manganese Bronze Ingots ... " "	17 to 18½
Phosphor Bronze ... " "	18 to 19½
Casting Aluminum Alloys ... " "	16 to 18

PHOSPHORUS—Duty free.	
According to quantity	30 to 35

Dealers' Buying Prices. Cents per lb.	OLD METALS.	Dealers' Selling Prices. Cents per lb.
11.75 to 12.25	Heavy Cut Copper	13.25 to 13.50
11.50 to 11.75	Copper Wire	13.00 to 13.25
10.50 to 10.75	Light Copper	12.00 to 12.25
10.25 to 10.50	Heavy Mach. Comp	11.50 to 11.75
8.25 to 8.50	Heavy Brass	9.50 to 9.75
6.25 to 6.50	Light Brass	7.25 to 7.50
7.75 to 8.00	No. 1 Yellow Brass Turnings	8.50 to 9.00
9.00 to 9.25	No. 1 Comp. Turnings	9.75 to 10.25
3.30 to ——	Heavy Lead	—— to 3.50
5.50 to ——	Zinc Scrap	—— to 6.00
5.50 to 6.50	Scrap Aluminum Turnings	6.00 to 7.00
11.50 to 12.00	Scrap Aluminum, cast alloyed	12.00 to 13.00
13.00 to 14.00	Scrap Aluminum, sheet (new)	13.00 to 14.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
17.00 to 23.00	Old Nickel	17.00 to 23.00

PRICES OF SHEET COPPER.

BASE PRICE, 19¾ Cents per Lb. Net.

SIZE OF SHEETS. Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
		Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins., but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins., but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins., but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins., but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins., but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Not longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ... 3c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ... 5c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

COLD ROLLED COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ... 1c.

ZINC— Duty, sheet, 15%.

	Cents per lb.
Carload lots, standard sizes and gauges, at mill ... 13.50 basis, less	8%
Open casks, jobbers' prices	14c.
Casks, jobbers' prices	14½c.

Metal Prices, March 8, 1915

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect March 3, 1915, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.16½	$0.17⅝	$0.18¼
Wire	.16¼	.17⅝	.18¼
Rod	.16¼	.18⅝	.19¼
Brazed tubing	.20¼	——	.22½
Open seam tubing	.20¼	——	.22½
Angles and channels, plain	.20¼	——	.22½

50% discount from all extras as shown in Brass Manufacturers' Price List.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire—Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.17⅝	$0.18⅞	$0.19½
Wire	.17½	.18⅞	.19½
Rod	.17½	.19⅝	.20¼
Brazed tubing	.21⅝	——	.23⅝
Open seam tubing	.21⅝	....	.23⅝
Angles and channels, plain	.21⅝	——	.23⅝

Net extra as shown in Brass Manufacturers' Price List.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire—Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

15¾c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	19c.	per lb. base
100 lbs. to 300 lbs. in one order	19½c.	" " "
Less than 100 lbs. in one order	21c.	" " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 19c. per lb.
Seamless Copper Tubing, 22c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe sizes with price per pound.

⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
27	26	21	20	19	19	19	19	19	19	19	20	21	23	25	26

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet— Brass.	Bronze.
⅝ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount, 50%.

PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Red	20c.	net base
Muntz or Yellow Metal Sheathing (14" x 48")	16½c.	" "
" " " " Rectangular sheets other than Sheathing	19c.	" "
" " " " Rod	16½c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 24¾c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more 5c. over Pig Tin. 50 to 100 lbs. 6c. over, 25 to 50 lbs. 8c. over, less than 25 lbs. 10c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 4c. over Pig Tin. 50 to 100 lbs. 5c. over, 25 to 50 lbs. 7c. over, less 25 lbs. 9c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Gauge.	Width. Inches.	1 ton.	50 to 2,000 lbs.	Less than 50 lbs.
20 and heavier	3-30	25.9	26c.	29c.
	3-30	26.9	27c.	30c.
21 to 24 inclusive	30-48	28.9	29c.	32c.
	48-60	31.9	32c.	35c.
25 to 26	3-30	27.9	28c.	31c.
	30-48	29.9	30c.	33c.
27	3-30	28.9	29c.	32c.
	30-48	31.9	32c.	35c.
28	3-30	29.9	30c.	33c.
	30-48	32.9	33c.	36c.
29	3-30	30.9	31c.	34c.
	30-48	34.9	35c.	38c.
30	3-30	31.9	32c.	35c.

The above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. No charge for boxing. F. O. B. Mill.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 22 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5/16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	11	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	20	26	30	56
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.	116	..	45	38	33	32	31	29	28	29	29	29	30	37	45	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..
24.	.022.	187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Price per lb. over 25 lbs., Diameter, B. & S. Gauge, No. 000 to 10 and 12, 26 cents. No. 12 to 20 inch, 28 cents.

BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

Quality.	Net per lb.	Quality.	Net per lb.
5%	18¼c.	16%	22¾c.
8%	20c.	18%	23¼c.
10%	20½c.	20%	25½c.
12%	21½c.	25%	33¾c.
15%	22½c.	30%	39¾c.

GERMAN SILVER WIRE.

Quality.	Net per lb.	Quality.	Net per lb.
5%	19¼c.	15%	26½c.
8%	21c.	16%	27½c.
10%	22½c.	18%	29¼c.
12%	24½c.	30%	45¼c.

The above Base Prices are subject to additions for extras as per lists printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are considerably higher.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2½c. to 3¼c. above the price of bullion.